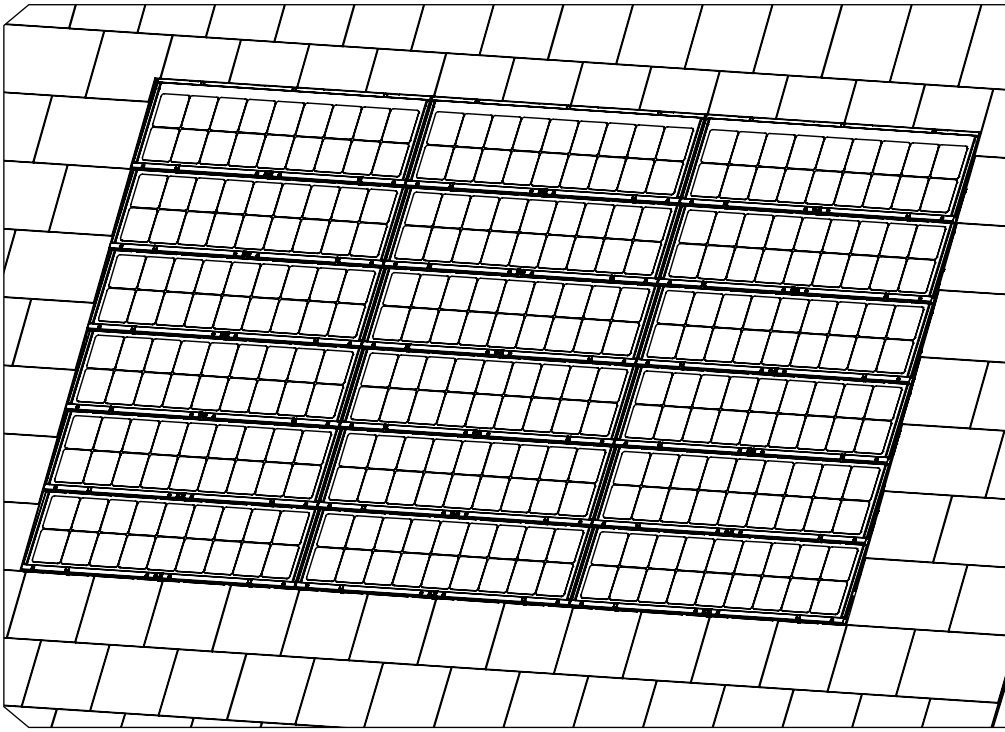
C21 solar tiles & slates

Roof Installation Guide & Warranty

C21e Slate



For new builds and re-roofing with C21e Slate type M50-S39

On completion please return this guide to the Commissioning Electrician

Part number: 15195-01

solarcentury

Revision: 01
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C21 solar tiles & slates

Installation Details

Please complete the information below.

Once the installation has been completed, this guide should be passed to the Electrician who will be responsible for commissioning the system.

Installation address:		
String voltage checks taken at:	Date / /	Time :
Checks taken by:	Company Name	
	Last Name	
	First Name	
	Contact Number	

Notes:

- *Within this guide the illustrations show an 18 unit C21e system, using 600mm x 300mm slates. Layouts for other slate sizes are provided in the appendices.*
- *The C21e solar electric roof slate will be referred to as a C21e or a C21e unit throughout.*

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1. Health and Safety

1.1 General guidance

- Construction (Design and Management) Regulations 2007 (CDM)* and general construction site training must be followed.
- Safe working at heights training should be adhered to.
- Anyone handling photovoltaic (PV) modules should be trained in the correct manual handling practice.
- All appropriate Health and Safety regulations should be followed correctly.
- Avoid installing the system in poor weather conditions, including strong wind, rain, ice or snow.
- The slate courses should be layed according to British Standard 5534: 2003* 'Code of practice for slating and tiling (including shingles)' unless instructed otherwise.
- Install all components as specified within this guide to ensure a weather tight finish and a valid warranty.

1.2 Electrical hazards

You must be aware of the following:

WARNING: PV modules produce a DC voltage whenever exposed to light. This voltage cannot be switched off.

WARNING: Care must be taken not to cut or damage cable insulation or expose bare wire.

- PV modules are pre-wired with touch-proof connectors to prevent an electrical shock during general handling.
- All work must be carried out with the C21e system disconnected from the mains electrical supply.
- PV modules do not present a risk as long as appropriate safety practices are followed at all times during installation.

**latest at time of print*

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1.3 Preparation for C21e installation

Follow the guidance below to ensure the C21e units are installed and handled correctly:

- Use this installation guide alongside your system design guide and roof schematic (see Appendix 1) to determine the location and layout of the C21e system on the roof.
- Use this installation guide alongside the string diagram (see Appendix 3) to understand the cabling and their connections on the roof.
- Ensure all cable connectors are dry and free of dirt before making connections.
- Ensure no cable ends are left exposed to the weather during work breaks or after completion of works. Keep the C21e units in a weatherproof environment before installation.
- Carry the C21e units with both hands by the frame, and avoid scratching the glass.
- Only load as many C21e units onto the roof as you expect to install during the session.
- Secure or remove any uninstalled units before leaving the roof to avoid possible wind damage.
- Do NOT walk on the glass surface of the C21e units. While robust, extreme point pressure may cause the toughened glass laminate to shatter.
- Do not leave tools or unsecured materials above the C21e installation area, to avoid potential damage to the units.

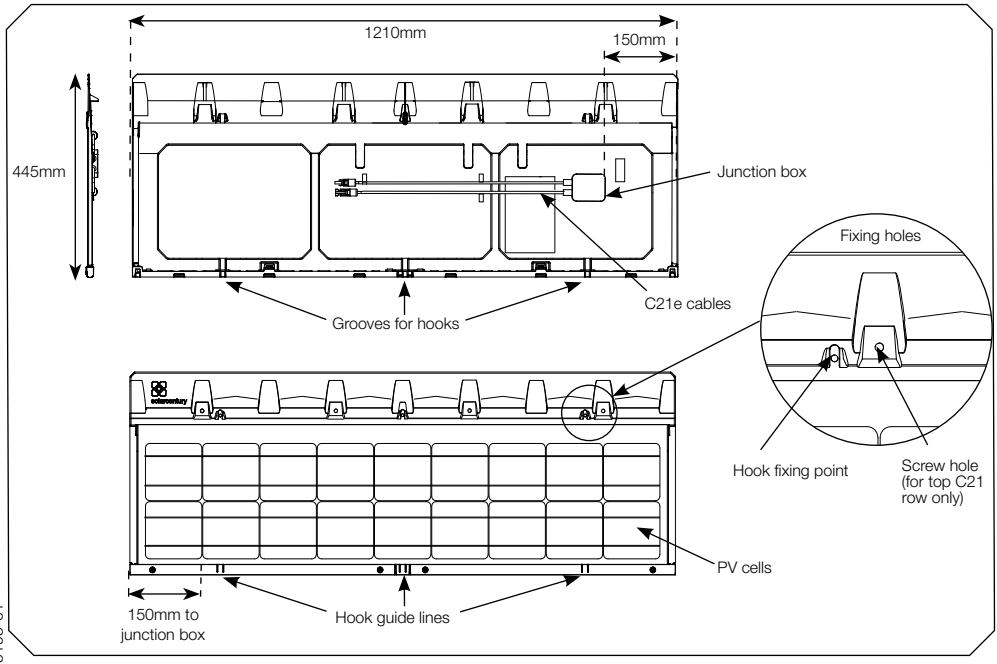
2. Components

2.1 Equipment required

- Standard roofing tool kit
- C21e specific tools:
  - Screwdriver (with Torx T20 drive supplied with this guide).
  - String checker including specialist touch proof test leads to check cable connections (available to order from Solarcentury).

2.2 The C21e Slate carton

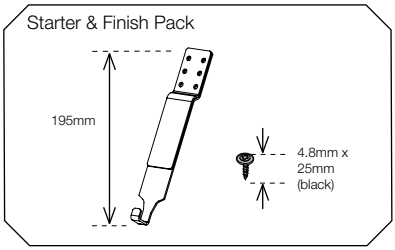
Each C21e carton contains six C21e units.
The C21e Slate has the following features:



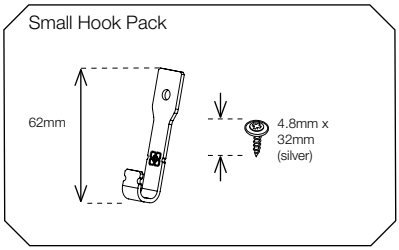
Please note: for visual simplicity, photovoltaic cells have been removed on subsequent diagrams in this guide.

2.3 The Roof Accessories Box

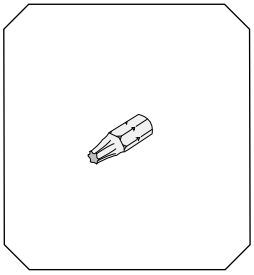
When a complete system is ordered, it will include a Roof Accessories Box containing the following components required for installing the C21e array:



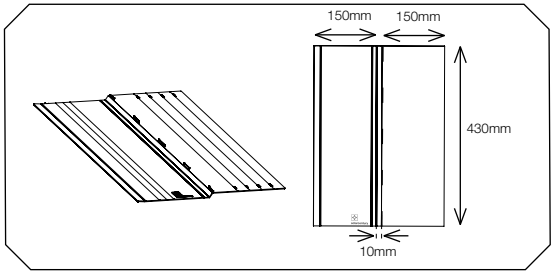
x3 starter hooks per C21e column.
Stainless steel screw with washer (Torx T20 drive).
Used with the starter hooks and to fix the top C21e unit in each column.



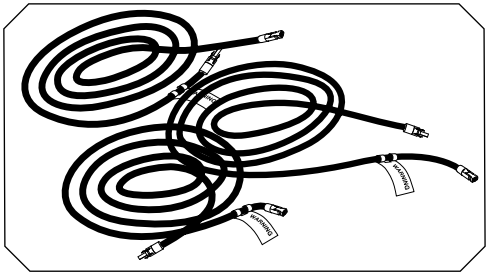
x3 small hooks per C21e unit.
Stainless steel screw with washer (Torx T20 drive).
Used for all other C21e units.



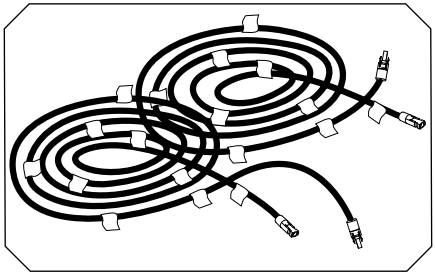
Torx T20 drive



Flexible C21e Soak Tray
(quantity specified at time of order)



Return Cables
(length is layout dependent, x1 cable per column)



10m Field Cables
(x2 per string)

The quantities of components vary by system size and layout (see Appendix 5 for details).

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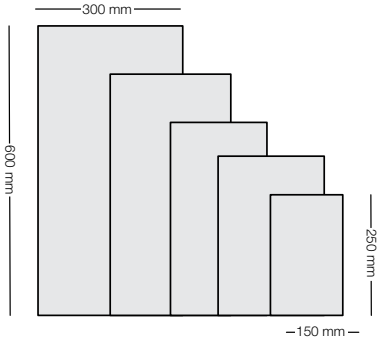
3. Pre-Installation Checks

Before you go on to the roof, **check that**:

- Your roof slates are compatible with the C21e units.



C21e Slate is compatible with **natural slates** across a wide range of standard sizes, ranging from 600mm x 300mm to 250mm x 150mm.

C21e Slate is also compatible with **standard fibre cement slates**, including Marley (Eternit) Rivendale, Garsdale, Birkdale and Thrutone.

Maximum slate thickness: 10mm

See the C21e datasheet, available at www.solarcentury.com, for the up to date list of compatible slates.

- Your accessories box contains the correct number of parts needed for your system size (see Appendix 5).
- The C21e units, particularly the glass surfaces, are undamaged.
- You have all the required tools including the string checker.
- All relevant site requirements have been checked and adhered to (including planning permission, building control or site rules).
- The C21e units will be situated on a roof pitch facing south (between south east and south west).
- The C21e units will be positioned in an unshaded location.
- You understand the roof schematic (see Appendix 1).
- You understand the string layout (see Appendix 3).
- You have read this guide in full.

4. Roof Preparation

4.1 General recommendations

- We recommend you use a breathable roofing membrane, or similar.
- Use 50 x 25mm tanalised battens nailed to rafters for the slates. Space them as standard across the whole roof in accordance with BS 5534: 2003.

WARNING: For 'warm roofs' eaves to ridge ventilation (or equivalent) should be provided to ensure adequate air flow behind the C21e units.

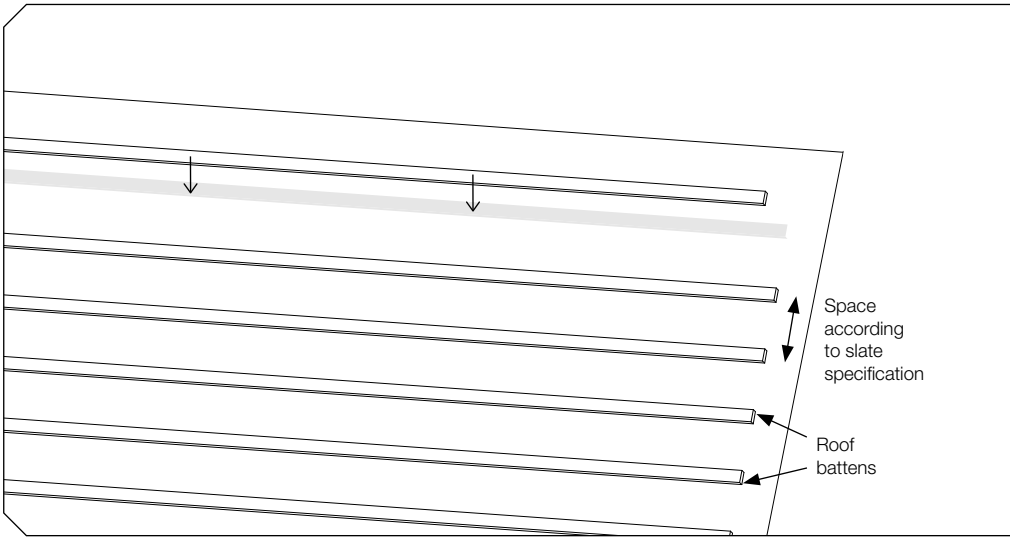


Diagram 1

WARNING: Make sure there are no upstanding nails that could break the glass on the C21e or damage the cables.

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4.2 Marking the area for the C21e system

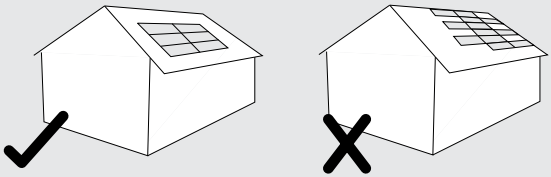
To make sure the C21e system is installed in the correct position on the roof, you must mark the area out before you begin.

- Refer to the Appendices and your Architect's drawings to understand which layout to use and where the system will be located on the roof.

Design Rules

The area that the C21e system will cover on the roof (Diagram 2) has been calculated using the following design rules. These rules exist to ensure a weathertight installation.

- Lay the C21e units straight bond.
- Allow a minimum of 2.5 slate widths between the edge C21e units and the verges or equivalent obstruction (one conventional slate plus one slate and a half).
- Allow at least three courses of conventional slates below the C21e area, and at least three courses of conventional slates above the C21e area.
- Locate the system central on the roof and not close to any vents.



See Appendix 5 for further details of required space for each C21e system size.

Consult the Site Manager or System Designer if the drawings do not conform to the above design rules.

The example C21e system in this guide uses 6 rows and 3 columns.

4. Roof Preparation *continued*

- When the layout and location of the C21e system has been identified, mark this area on the roof.

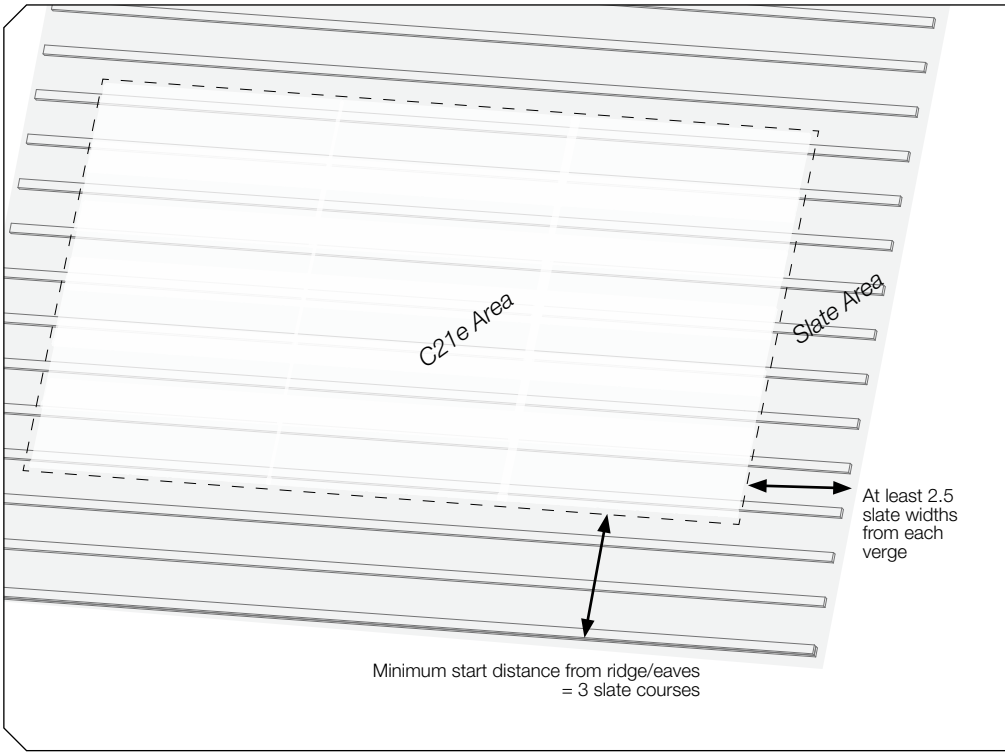


Diagram 2

4.3 Laying the bottom slate courses

- Lay the bottom courses of conventional slates using standard practice. Start from the eaves and continue up to the area marked for the C21e system.
- Place a slate on the next course (shaded below) and chalk from the tail of the slate across the width of the C21e area. This line is where the bottom edge of the C21e units will sit.

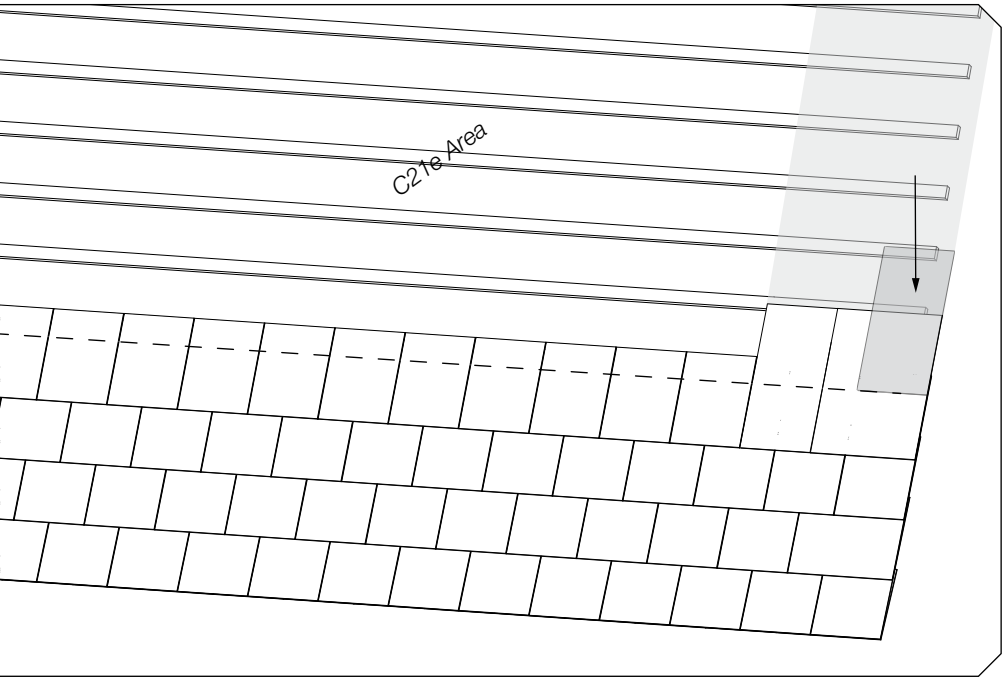


Diagram 3

4.4 Positioning the C21 battens

The C21e units require different batten spacing to the slates. Refer to the roof schematic for an overview (see Appendix 1).

Extra battens need to be added that span the width of the C21e area. These will support the C21e units.

- Start at the line marked in step 4.3 and measure 380mm up the roof. Fix a batten here to support the 1st C21e course.
- Measure from this batten, at 300mm intervals up the roof in the C21e area. Add enough battens for your system to support the remaining C21e units. (C21e battens are shaded in Diagram 4.)

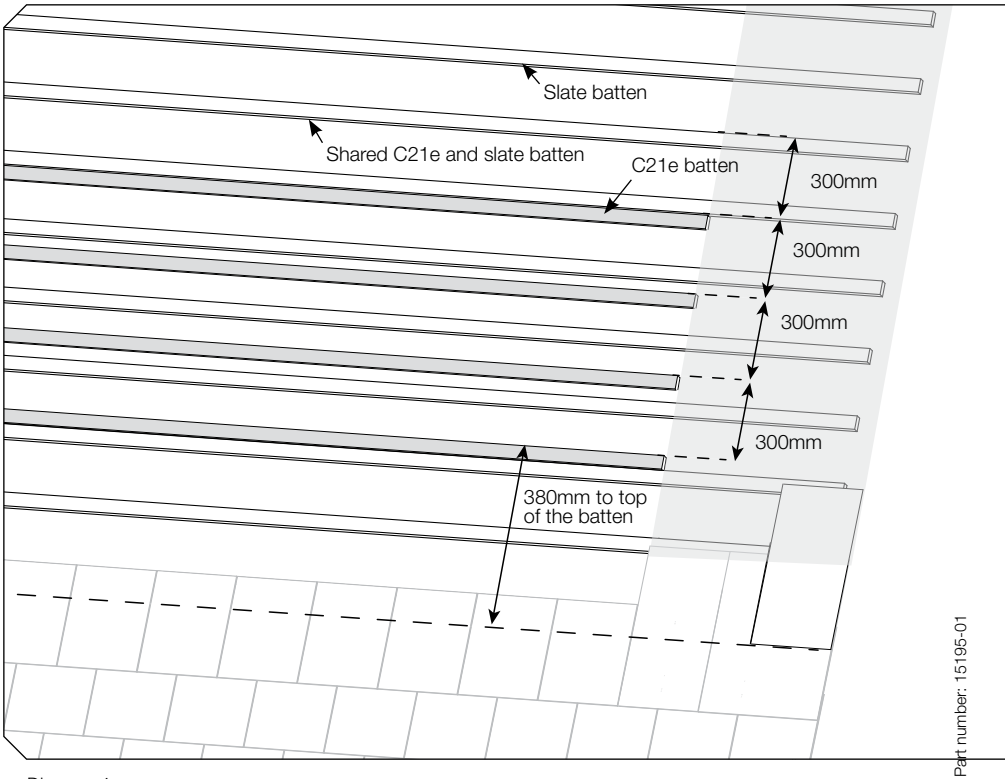


Diagram 4

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4. Roof Preparation ***continued***

4.5 Removing conflicting battens

- The junction box on the back of the C21e may interfere with some of the slate battens. To avoid this, the slate battens should be cut out in the C21e area to ensure the C21e units lay flat (Diagram 5).

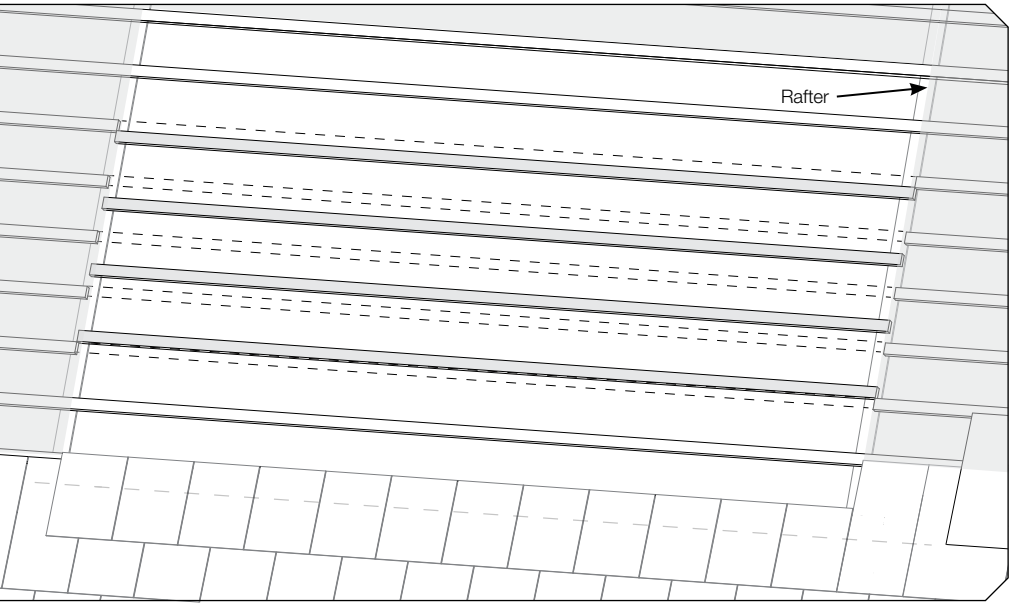

Diagram 5

WARNING: Make sure that all battens start and finish on a rafter for adequate support.

WARNING: Make sure there are no upstanding nails that could break the glass on the C21e or damage the cables.

4.6 Positioning the starter hook batten

The first row of C21e units are held in place by larger starter hooks. These hooks require an extra batten.

- The hook has three pairs of screw holes, one of these pairs must be in the centre of the batten. To determine the fixing point for this batten, temporarily place a starter hook on the chalked line (Diagram 6b) and use it as a guide. This batten must span the width of the C21 area (hatched below).

WARNING: Ensure you use the larger starter hooks.

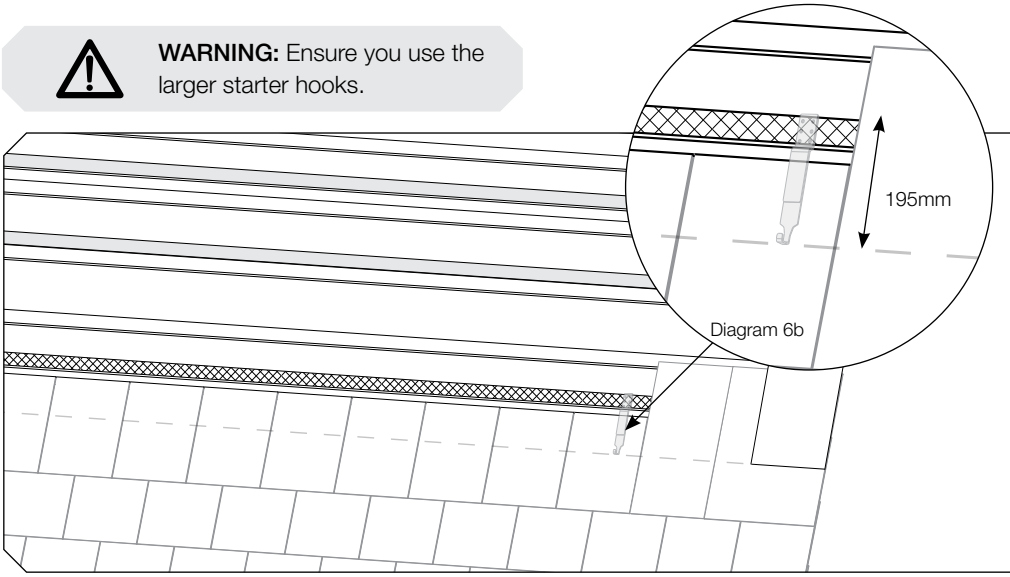

Diagram 6

4.7 Positioning the field cables

Before fixing the C21e units you must consider how the cables are connected and where they enter the roof space.

- Refer to the string diagram for an overview of cable positions and connections (Appendix 3).
- At the top of the C21e area, locate a suitable position where the field cables can enter the roof later in the installation (a lap in the membrane).

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5. C21e Installation

5.1 Laying the right hand section

Slates need to be fitted up the right hand side of the C21e area. On each slate batten a flexible C21e soak tray needs to be installed between the C21e unit and the slate, as described below.

The soak trays will ensure that joins between C21e units and slates are weather-tight.

- Install slates to the side of the C21e area as you would at a verge (i.e. using a whole slate or a slate and a half).
- Push a soak tray behind the slate, resting on the slate batten. It should be positioned so that the raised centre ridge is on the **right** hand side and the Solarcentury logo is on the bottom left (inset Diagram 7a).
- The bottom of the soak tray should be in line with the tail of the slate, and the raised centre line should sit flush with the slate edge. (The exposed half of the soak tray, with the logo, will be covered by the C21e unit, shown in step 5.2.)

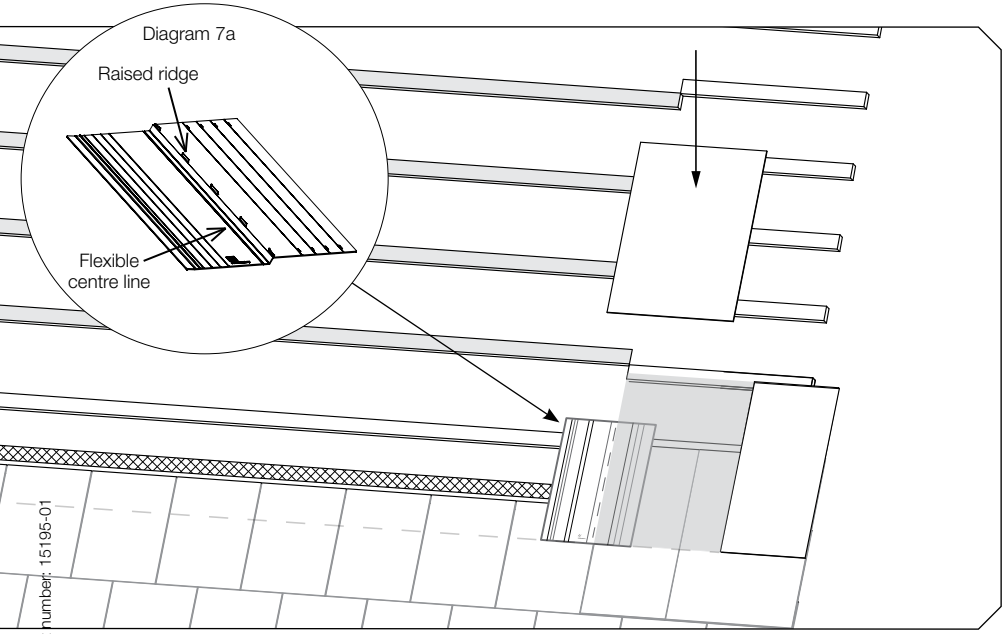

Diagram 7

5. C21e Installation *continued*

- Continue on the next slate course; install the slates as you would at a verge (i.e. using a whole slate or a slate and a half).
- Then install a soak tray beneath the slate - ensure that the lower edge of the soak tray is in line with the lower slate edge, and is not visible.

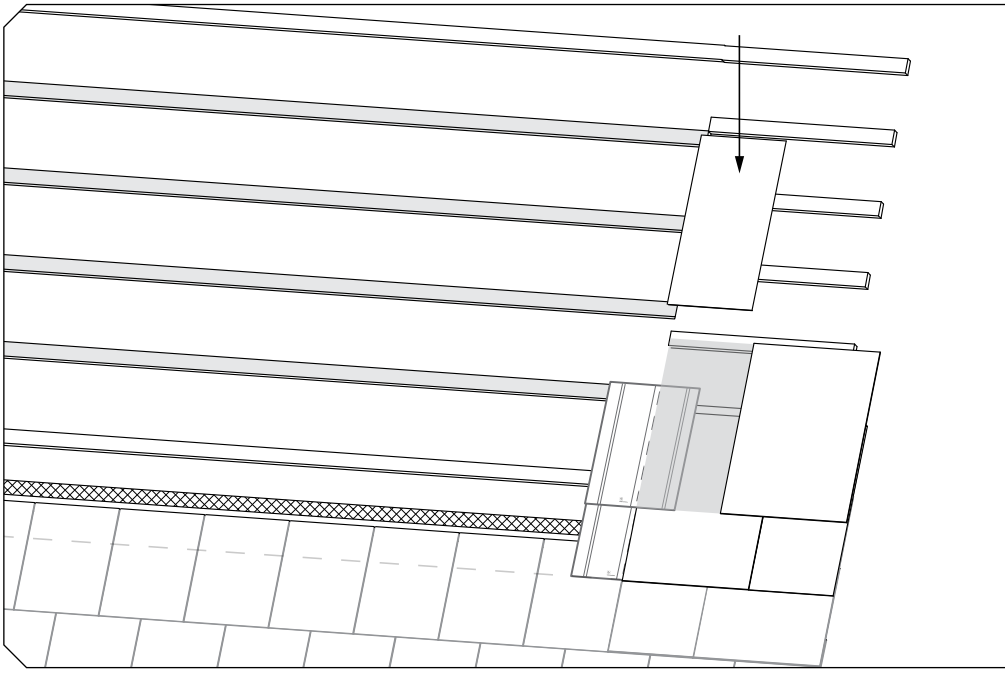

Diagram 8

WARNING: Make sure there is at least one whole slate between the edge of the C21e area and the verge of the roof (or equivalent obstruction).

WARNING: Edge soak trays (between slate and C21e) rest on the slate battens. Middle soak trays (between C21 and C21) rest on the C21e battens. Familiarise yourself with the soak tray tips in Appendix 2.

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5. C21e Installation *continued*

- Continue laying the slates and soak trays in this column until you have one soak tray on each slate batten in the C21e area.
- Depending on the slate size and batten spacing you may need to add one extra soak tray on the next batten, to provide adequate headlap. This should be repeated on the final soak tray column.

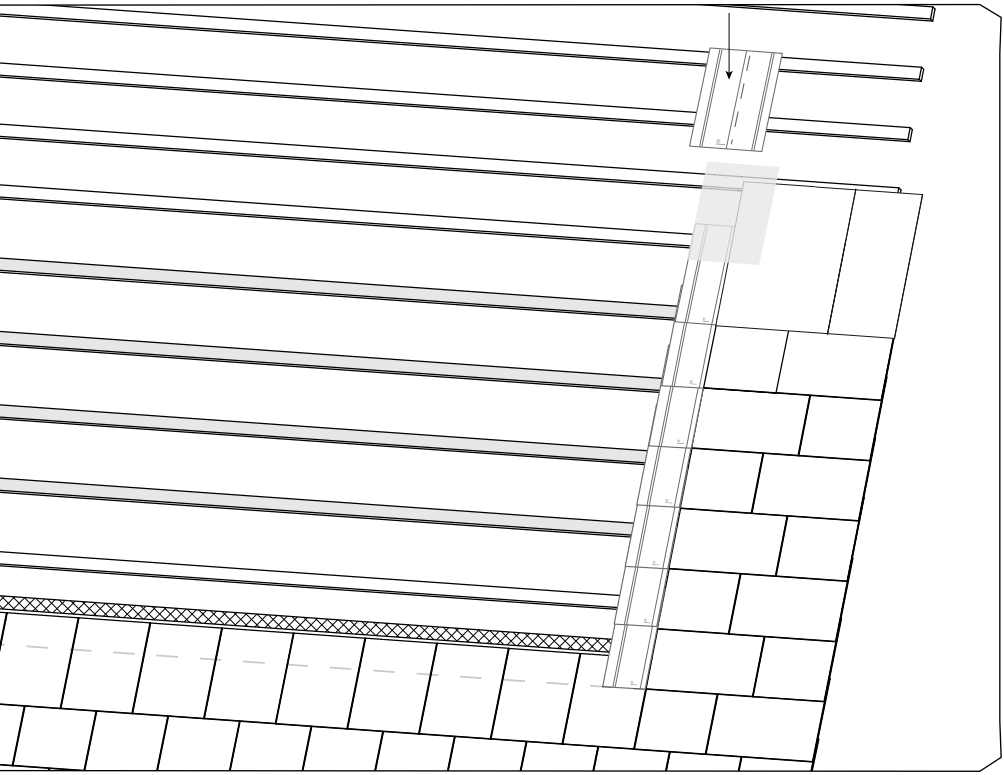


Diagram 9

5.2 Fitting the first C21e Slate

It is advised that the C21e units are laid column by column. This allows the C21e cables to be connected and tested as you go.

The first column of C21e units should begin on the lowest C21e batten and sit flush with the slates on the right.

Three large starter hooks are used to secure the front of each C21e unit on the bottom row. To position the hooks correctly:

- Temporarily place a C21 in position on the first C21 batten. **Leave a 10mm gap between the C21 position and slate to allow the soak tray to bend (10a).**
- There are three guide lines on the front of the C21 frame (10a) that indicate the starter hook positions. Mark these points on the slates (X on Diagram 10).
- Remove the C21 and fix 3 starter hooks to the batten at the marked points (10b).

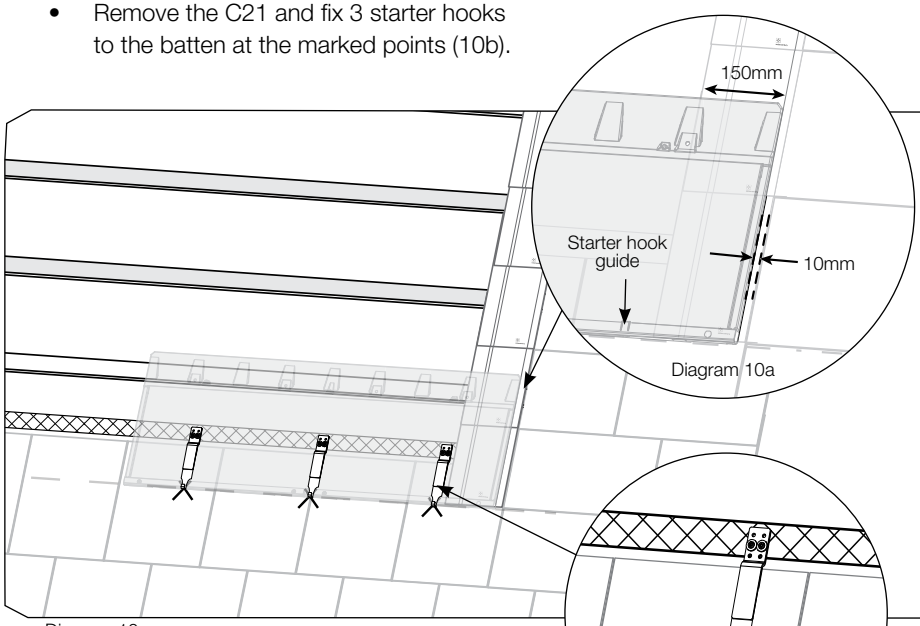


Diagram 10

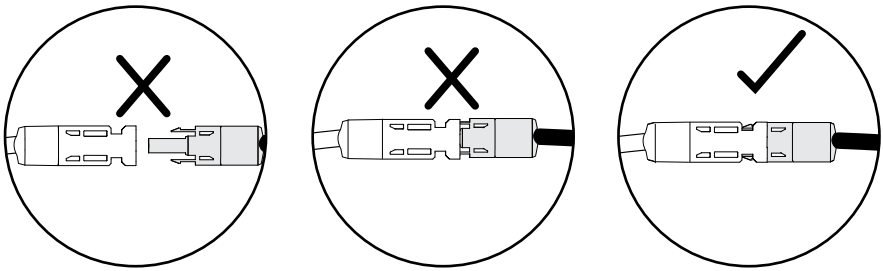
✓ TIP: The screw holes must be in the centre of the batten.

5. C21e Installation *continued*

WARNING: Only use the hooks, screws and washers supplied. These form part of the system designed to provide a weather-tight seal and are correctly sized for the C21e units. Using any others will invalidate the warranty. Use the correct quantity every time.

- Rest the first C21e face down as shown in Diagram 11 and pass both C21e cables under the batten.
- Firmly connect the black C21e cable to the end of a return cable (Diagram 11a).
- Pass the length of the return cable under the battens to the top of the column.

TIP: The longer field cables (that enter the roof space) look similar to the return cables. To help distinguish between them, the return cables have a red tag and the field cables are marked with one of the following symbols: ★ ● ■ ▲



WARNING: Make sure there is no gap between any connectors as this will cause the system to fail. To ensure a firm connection, push the connectors together until they **click**.

5. C21e Installation *continued*

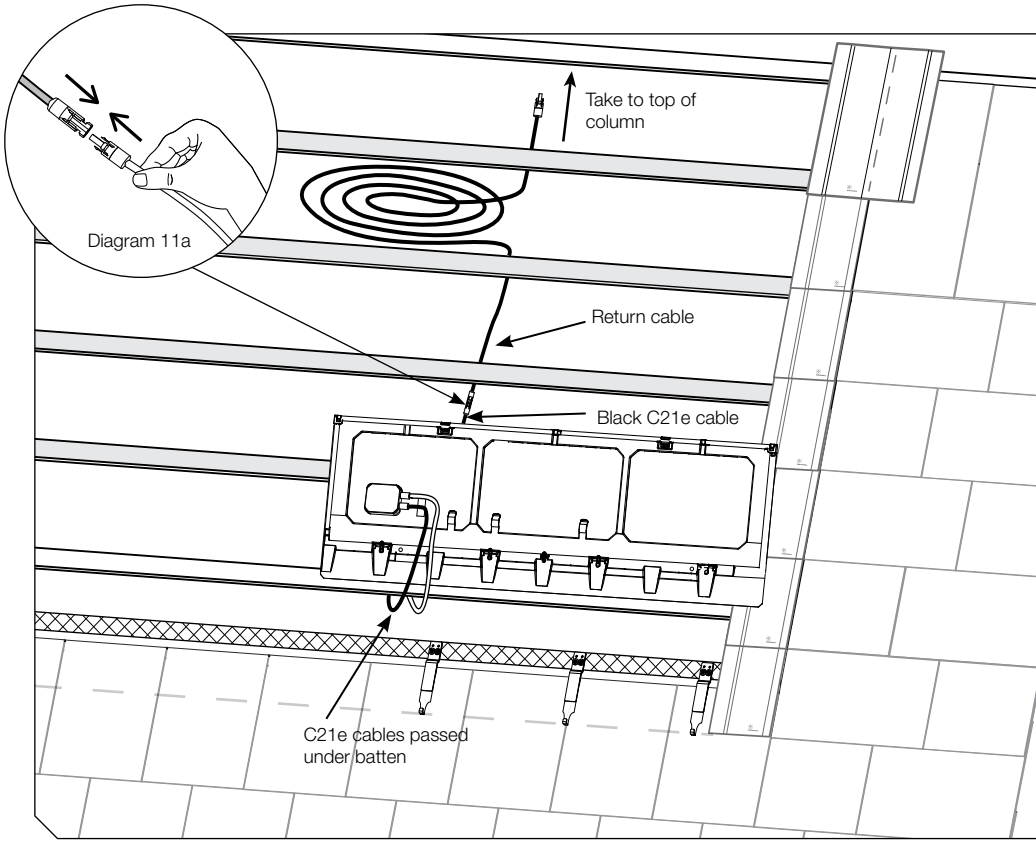


Diagram 11

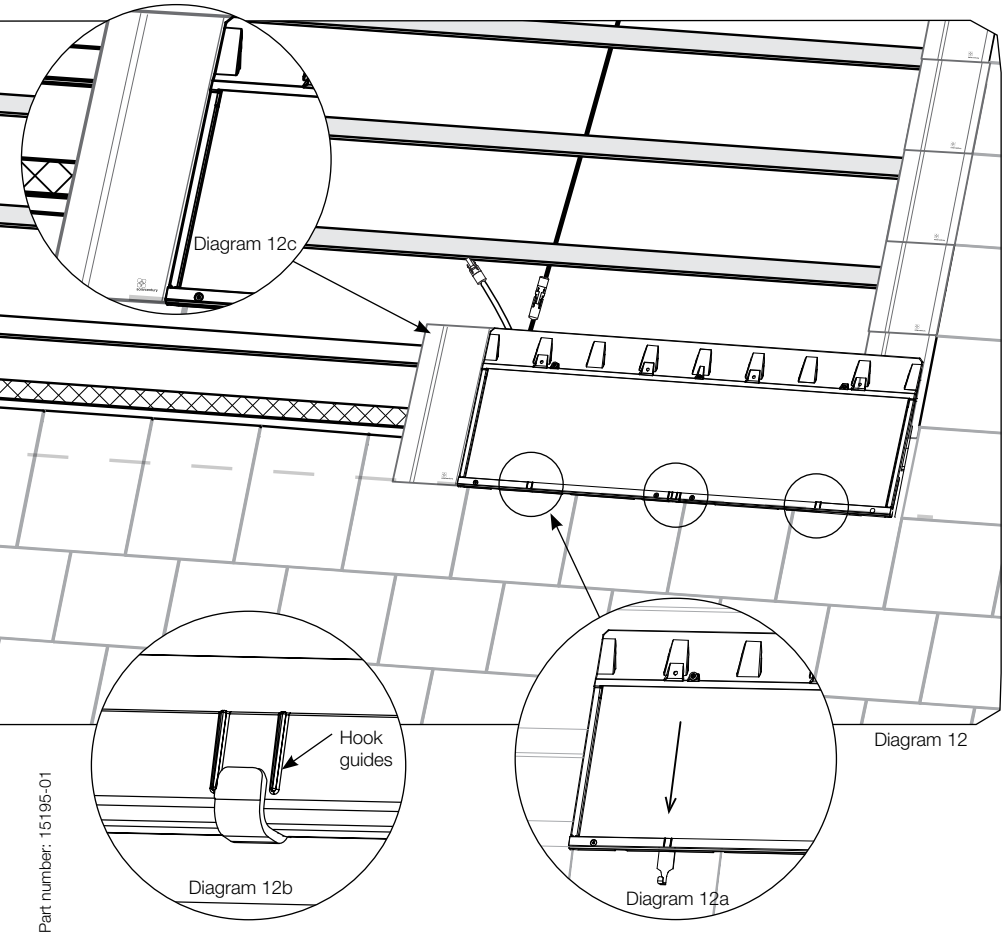
WARNING: Ensure that there are no upstanding nails that could damage the glass surface of the C21e.

5. C21e Installation *continued*

- Turn the C21e round the correct way with the nib resting on the batten, and clip the grooves at the front into the 3 large starter hooks (12a and b).

The C21e should cover the exposed half of the right soak tray (Diagram 12). There should be a 10mm gap between the C21e and right slate (previous inset 10a).

- Fit a soak tray half way under the **left side** of the C21e unit resting on the C21e batten. The raised centre line of middle soak trays should sit **beneath** the C21e on the right, and the Solarcentury logo is on the left (12c).



5.3 Completing the first C21e column

- Fix 3 small C21e hooks into the hook fixing points on the top of the C21 frame ready to hold the next C21e (13a).
- Rest the next C21e face down on the batten above. Firmly connect its black cable to the red cable from the C21e on the course below.

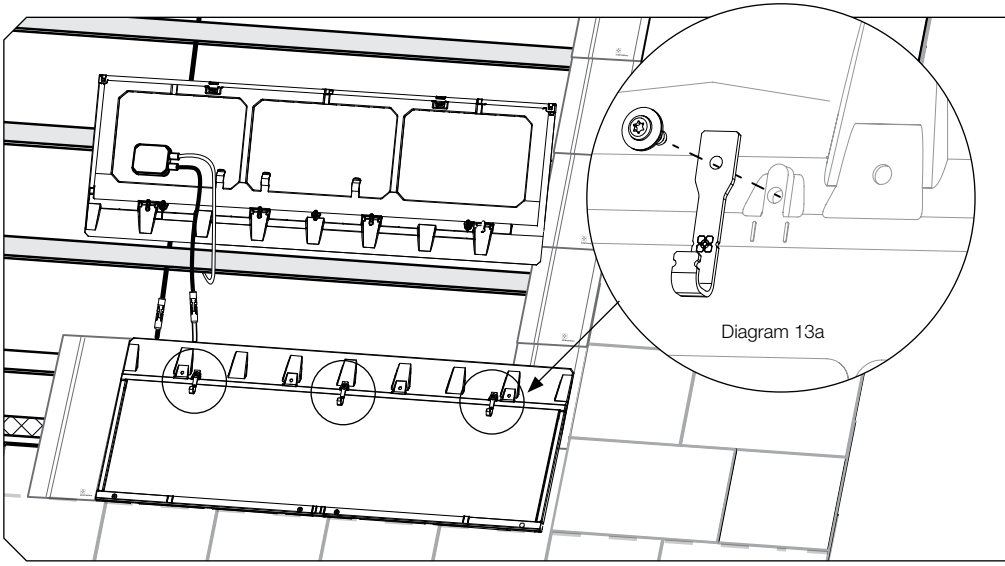


Diagram 13

- As before, pass the red cable from this C21e under the batten above ready to connect to the next C21e in the column.
- Turn the C21e round the correct way.
- Check the position of the soak trays - refer to the tips in Appendix 2.

WARNING: Ensure that there is no risk of the cables being trapped or pierced when the C21e unit is fixed.

WARNING: Make sure that when the Return Cables and C21e cables are pushed up the roof they lie close to each other. This is important throughout the installation to prevent electrical interference.

5. C21e Installation *continued*

- Clip the front edge of the C21e unit into the small C21e hooks. Make sure that the hooks align with the guide lines on the front and sit in the grooves on the back (Diagram 14a).
- Place another soak tray half way under the left side of this C21e. It should sit **over** the frame of the C21e on the course below (14b).
- Screw in three small C21e hooks ready for the next C21e (Diagram 14c).

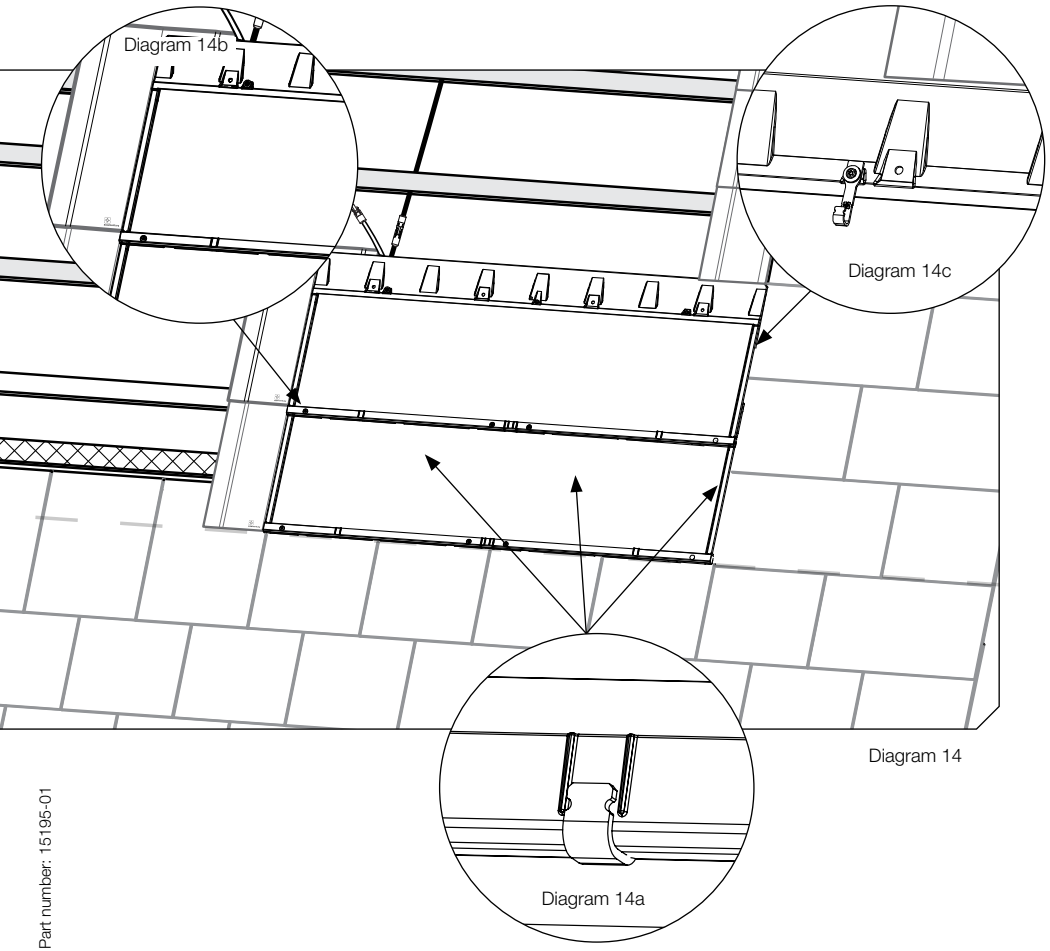


Diagram 14

- Complete the column by repeating this process. Remember to use the small C21e hooks, connect the cables, insert a left soak tray and check the right soak trays as you go.

5.4 Fixing the top C21e in a column

- Use 4 of the smaller 4.8 x 25mm screws provided in the Starter & Finish Pack to fix the C21 unit at the top of the column. Use the **screw holes** (15a), to prevent the conventional slates in the next course from kicking up.

At the top of each column you should be left with the end of the Return Cable and the end of the red cable from the last C21e unit.

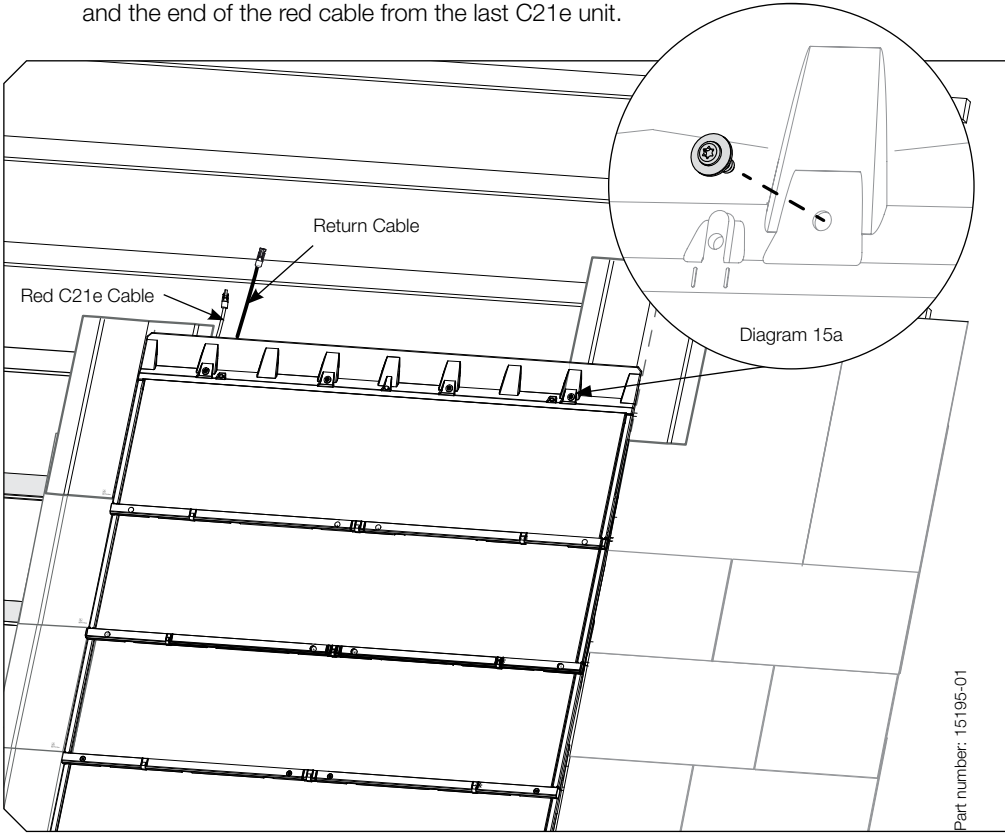


Diagram 15

5.5 Checking the C21e cable connections

- At the top of each column, ensure that the C21e cables are left in an accessible position. They will be connected later in the installation.

Solarcentury recommends that a string check is carried out **for each column** to check the cable connections (Diagram 16).

- To carry out a string check follow the instructions in Appendix 3 using the string checker.

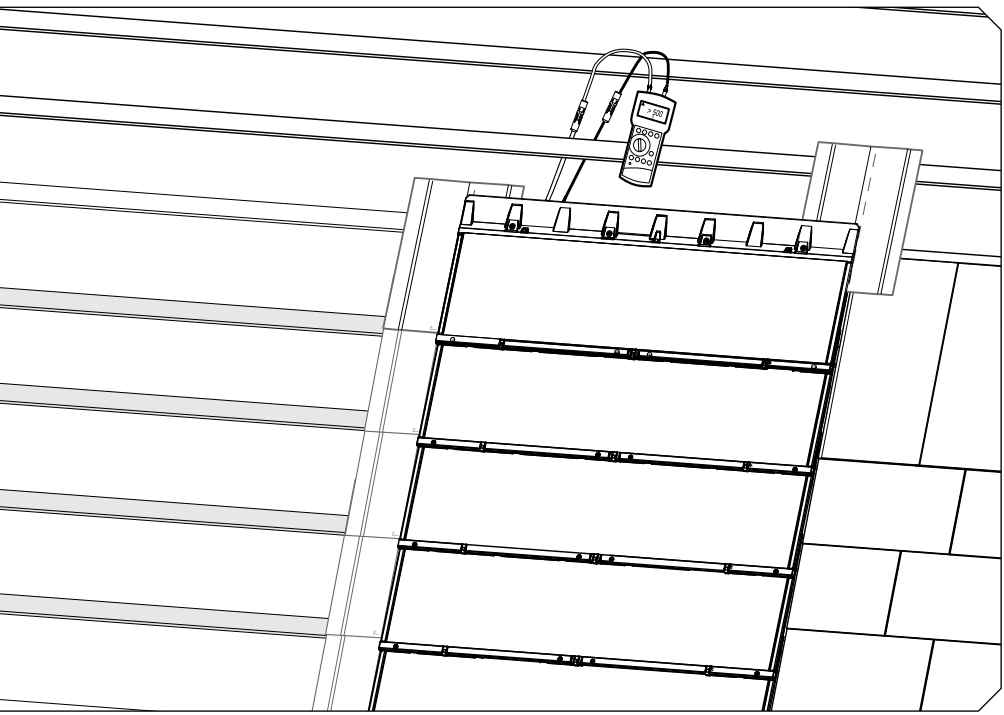


Diagram 16

WARNING: Always use safety leads with the string checker.
To avoid risk of electrocution, never use standard meter probes.

5.6 Laying a middle C21e column

To install a middle column of C21e units, return to the bottom and work upwards.

Follow the method described in sections 5.2 to 5.5:

- Position and fix the starter hooks on the starter hook batten (as 5.2).

WARNING: For middle columns do NOT leave the 10mm gap between each column of C21e units.

- Take a C21e and push both cables under the batten above. Connect the black cable to a return cable and pass to the top of the column.
- Turn the C21e round the correct way and clip it into the starter hooks.
- Fit a soak tray to the left of the C21e unit on the C21e batten.
- Follow steps from 5.3 to 5.5.

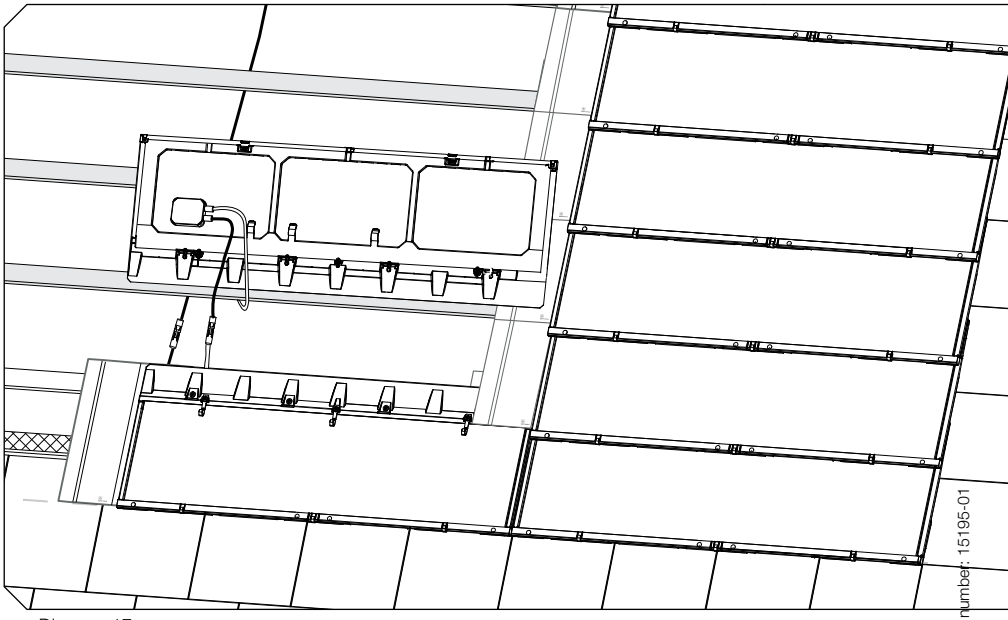


Diagram 17

Part number: 15195-01

5.7 Laying the final C21e column

To install the final column of C21e units next to the slate, follow the order below.

✓ NOTE: In this column, fix the small hooks **after** laying the slates and soak tray.

- Position and fix the starter hooks on the starter hook batten as 5.2.
- Take a C21e and pass both cables under the batten above. Connect the black cable to a return cable and pass to the top of the column.
- Clip the C21e into the starter hooks.
- Position the soak tray behind the slate so that the Solarcentury logo is on the **top right**, and under the C21e unit (18a).
- Keep the soak tray behind the C21e. The bottom of the soak tray should be in line with the tail of the C21e, and the centre line should sit flush with the C21e edge (Diagram 18). The exposed half of the soak tray will be covered by the slate (18a).

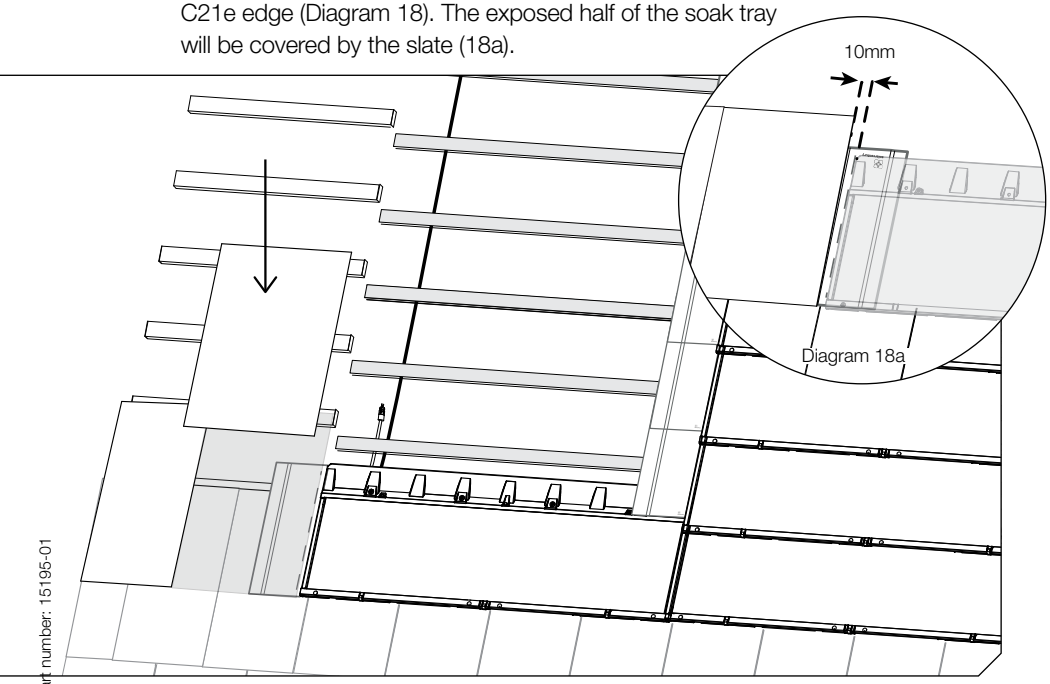


Diagram 18a

Diagram 18

- Install the slates on the left side of the C21e unit as you would at a verge (i.e. using a whole slate or a slate and a half). This will ensure weather tightness.

WARNING: Ensure the slates sit flush with the raised centre line on the soak tray to provide a 10mm gap between the C21e and slate (18a).

- Fix 3 small hooks to the C21 frame as 5.3.
- Complete the column following this method of placing a C21e, fitting the left slates and soak tray, then fixing the small hooks.

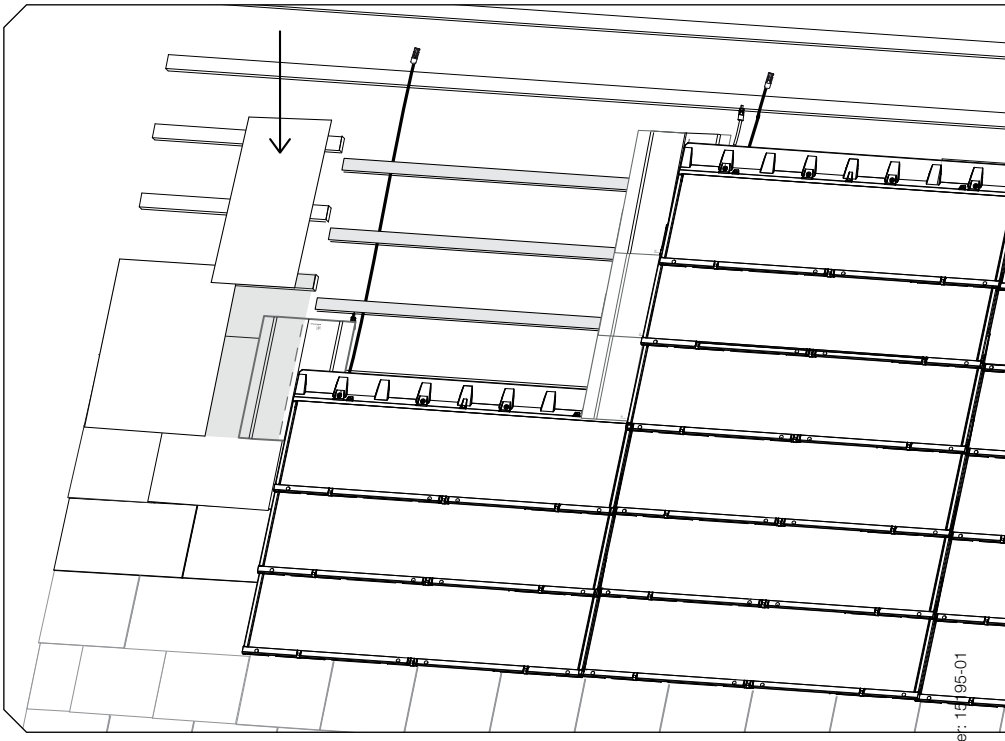


Diagram 19

Part number: 15195-01

5. C21e Installation *continued*

- Carry out a string check as 5.5.
- Add an extra soak tray at the top of the final column if required.

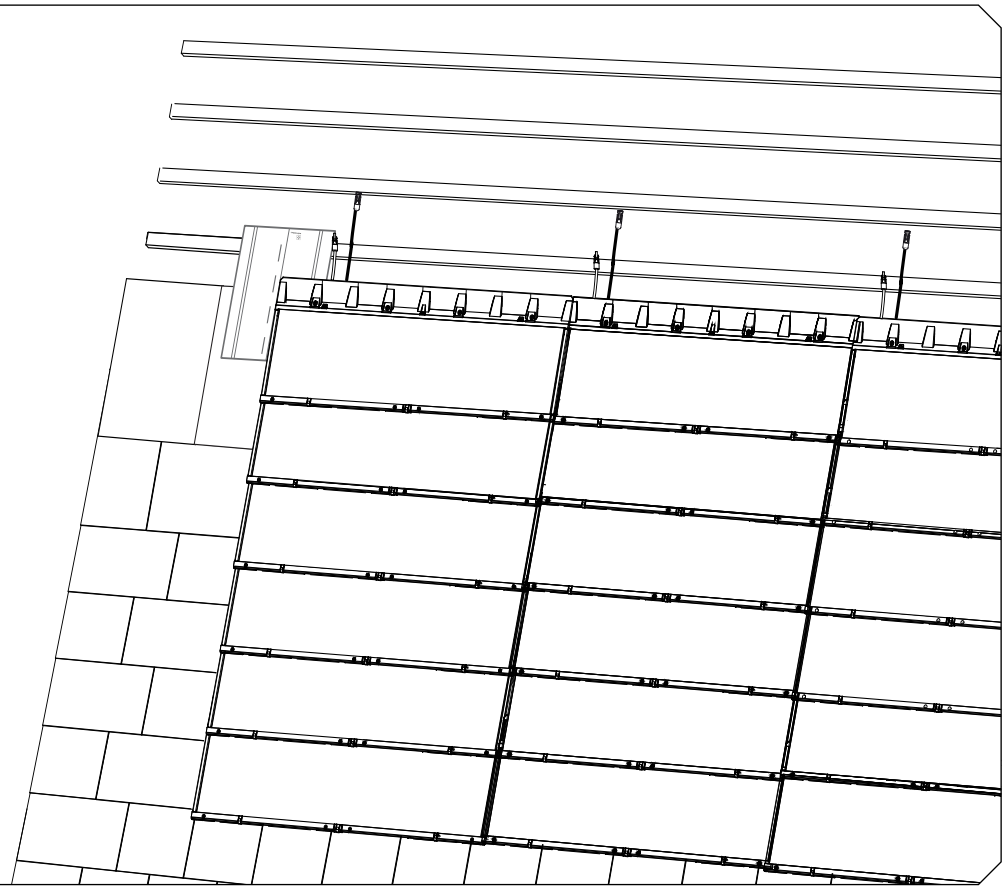


Diagram 20

5.8 Completing the cabling

When all the C21e units are fixed in place, the cables at the top of each column must be connected together to complete the string or strings.

The following example explains how to connect a single string, 18 C21e unit system. For two string systems please refer to Appendix 3. Consult Appendix 5 to confirm the number of strings for the system size you are installing.

- Start at the right hand C21e column. At the top, connect the return cable to a field cable (marked with one of the symbols ★ ● ■ ▲).
- At the top of each other column in this string, connect the return cable to the spare red C21e cable from the previous column.

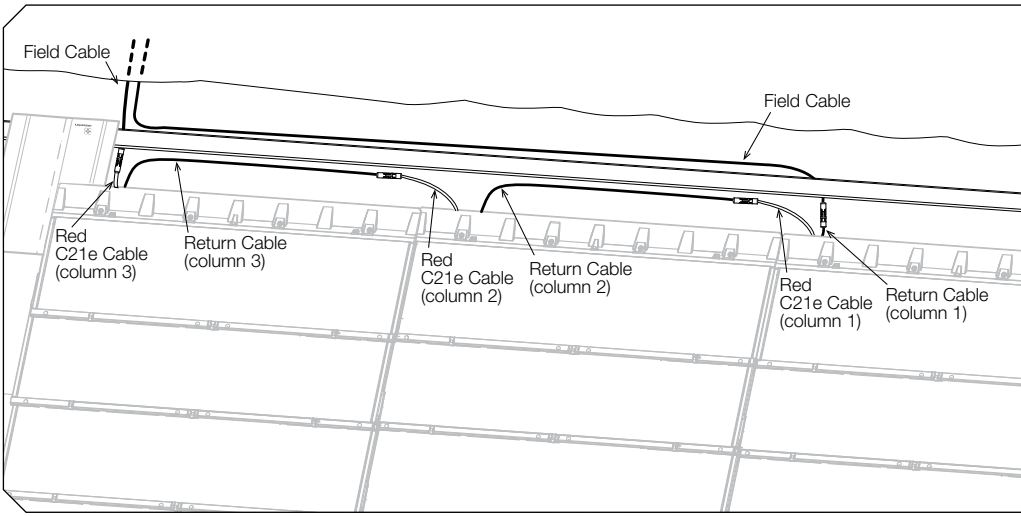


Diagram 21

WARNING: Each string in an array should always have the same number of C21e units. Uneven strings will cause the system to fail and invalidate the warranty.

- At the final left C21e column connect the remaining red C21e cable to a field cable with the same symbol as the field cable in column 1 (see Diagram 22).
- Bring the field cables together above this column and carry out a string check for the completed string by following the instructions provided in Appendix 3. Record the results on the reverse of this guide.
- Use a cable tie (or equivalent) to fasten the cables to the battens. Securing the cables will avoid potential stress if they are pulled from within the loft space during the electrical installation.
- Once secured, take the ends of the field cables and fit the supplied plug covers to protect them from any dust or moisture within the roof space. Push the cable ends through a lap in the membrane at the top of the final column and into the loft space (as identified in step 4.7).

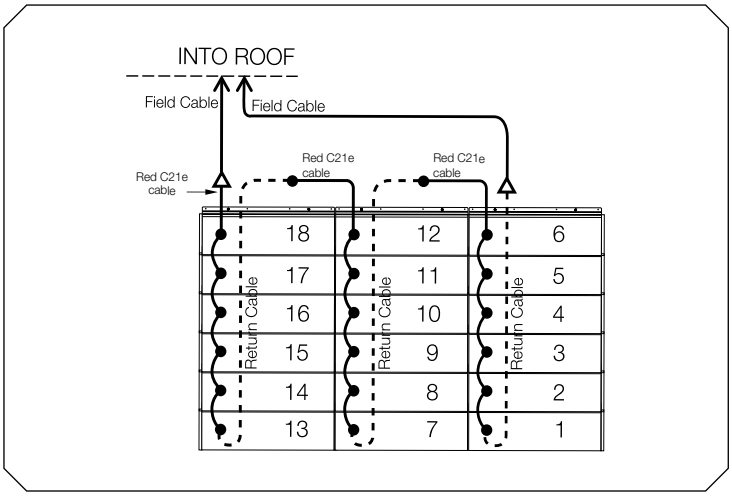


Diagram 22

WARNING: Ensure that the field cables and return cables at the top of the installation lie close to each other.

6. Completing the C21 Array

When all the C21e units have been fitted, a string check for the system is complete, and the Field Cables passed into the loft space, the remaining slates can be laid.

- Lay an eaves course of slates on the batten above the C21e units.
- Continue laying the slates for the remainder of the roof using standard practice.

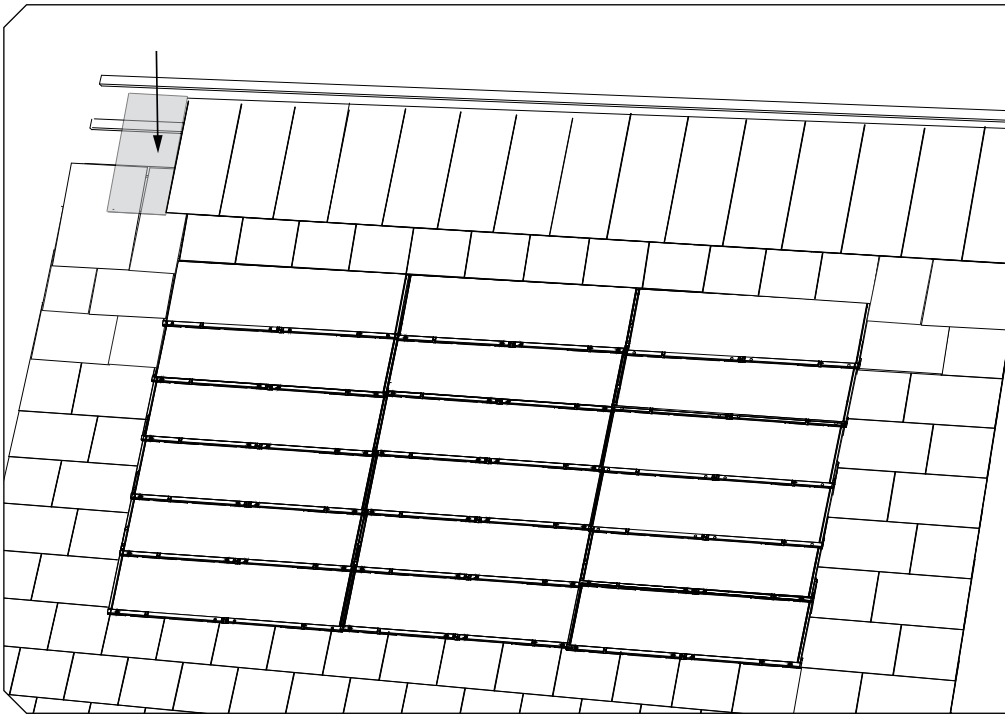


Diagram 23

WARNING: Take care not to drop tools or materials on the C21e units.

NOTE: Please remember to dispose all unused materials safely, and recycle where possible.

Part number: 15195-01

7. Disclaimer of Liability

Instructions given in this guide are general guidelines only for the design, installation and use of the C21e units together with any associated components. Due to the wide variety of materials, equipment and sites which an installation may involve this guide cannot consider the individual technical requirements relevant to every individual project and/or site.

If you have detailed questions about any specific project and/or site please contact Solarcentury.

Before installing the C21e units, contact the appropriate authorities to determine the permissions, consents, approvals, licenses, installation and inspection requirements which apply to the site and the installation. Solarcentury accepts no responsibility or liability in this respect.

This guide is based on Solarcentury's knowledge and experience and is believed to be reliable but the guide does not constitute a warranty, express or implied.

Solarcentury does not assume responsibility and expressly disclaims liability for any loss, damage or expense arising out of or in any way connected with incorrect handling, installation, operation, use or maintenance of the C21e units.

No responsibility is assumed by Solarcentury for any infringement of patents or other rights of third parties that may result from use of the C21e units. No license is granted by implication or otherwise under any patent or patent rights.

Solarcentury reserves the right to make changes to the Product, the specifications or this guide, without prior notice.

Incorrect and/or faulty installation, operation, use or maintenance may be dangerous and may invalidate any warranty which may apply to the C21e units. End users should remember that the C21e units require professional installation using special tools and expert know-how.

No part of this guide may be reproduced in any form by any means without Solarcentury's express written consent.

Part number: 15195-01

8. Warranty

Product Warranty for C21e solar electric roof slates in United Kingdom and Republic of Ireland

Model number: C21e Slate M50-S39

This warranty applies to the Solarcentury Modules with the model numbers listed above which were purchased from Solarcentury or an authorised distributor, installer or reseller (an "Authorised Distributor") and purchased and installed in the territory indicated above.

In this warranty "Product" means each of the listed Modules individually.

In addition to your statutory rights, which are unaffected, Solarcentury guarantees that, from the date of original purchase from Solarcentury or its Authorised Distributor (or, in the absence of proof of purchase, from the date of manufacture):

A Materials and Workmanship – 10 years
The Product shall be free from defects in materials and workmanship in manufacture for a period of 10 years.

B Power Output – 25 years
(1) The power rating of the Product will remain at 90% or more of its Peak Power rating[1] for 10 years; and
(2) The power rating of the Product will remain at 80% or more of its Peak Power rating for 25 years.

If a Product fails to meet the standard guaranteed and the conditions below are met, then Solarcentury will, in its sole discretion: (a) repair or replace the defective Product with an equivalent product; or (b) refund the purchase price of the Product; or (c) provide the owner with additional PV modules required to make up the power lost or provide to the owner compensation for power lost up to a maximum value of the purchase price of the Product, such loss in power having been proved to have been suffered by the owner of the Product and determined by Solarcentury (in its sole and absolute discretion) to be due to defects in materials or workmanship.

Notwithstanding the above, if the Product is used in any non-land based applications, any Power Output warranty claims must be made within 10 years.

[1] In this context, the power rating of the Product will be that measured by or on behalf of Solarcentury under Standard Test Conditions (irradiance of 1000W/m2, light spectrum AM 1.5g and a cell temperature of 25 degrees Celsius) and may not equate to that produced by the Product under other conditions. The relevant "Peak Power" is defined in Solarcentury's Datasheet at the time of shipment.

Part number: 15195-01

8. Warranty *continued*

Solarcentury shall have no liability for any other costs or losses howsoever arising (and for the avoidance of doubt) this guarantee does not include the costs of labour or transport or any other associated costs including, without limitation, costs involved in removing or returning the Product to Solarcentury, or its re-installation. Any Product (or parts) replaced shall become the property of Solarcentury and the replacement Product shall only have the warranty cover for the remainder of the original warranty period.

The conditions:

(a) The Product is properly installed in a suitable location in accordance with Solarcentury's Datasheets and instructions for design, installation, operation and maintenance of the Product (together the "Product Guide") and in accordance with all applicable laws and standards as updated and applicable at the date of installation whether or not those standards are identified in the Product Guide;
(b) The Product has not been removed from the location in which it was first installed, nor connected to, or used with, any unapproved device;
(c) The Product has not, in Solarcentury's absolute judgment, been damaged during transportation, delivery, storage, handling or installation;
(d) The Product has not, in Solarcentury's absolute judgment, suffered damage caused by extraneous causes such as structural movement of the roof, accident, an impact of significant force, fire, lightning, flood, severe weather, interference by animals, insect and pest infestation or other Acts of God or other events, howsoever caused, reasonably beyond Solarcentury's control;
(e) The Product has not been subject to misuse, neglect, abuse, alteration or improper application;
(f) The Product has not been exposed to conditions (including, where applicable, excessive levels of pollution or wind speeds) at the property where it was installed which are more adverse than those which the Product is designed to withstand as stated in the Product Guide;
(g) The Product has been operated and maintained in accordance with the Product Guide;
(h) The labels, serial numbers or barcodes on the Product or any of its components have not been altered, removed or made illegible;
(i) Any alleged defect in materials is not merely cosmetic or due to normal and reasonable wear and tear of the Product;
(j) Solarcentury has been paid in full for the Product;
(k) A claim is notified: (i) in accordance with the procedure set out below, and as set out in the Product Guide; (ii) within the applicable warranty period set out above; and (iii) within two months of the first date on which problems with the Product were detected or ought to have been detected.

Part number: 15195-01

8. Warranty *continued*

If any of the above conditions are not met then Solarcentury shall have no obligations under this guarantee and no rights shall accrue as a result of this warranty.

Procedure for making a claim:

Before making a claim, you should review the Product Guide to make sure that you have followed all the guidance.

If after reviewing the Product Guide you are still concerned that the Product is not performing as it should, please contact your installer or maintainer in the first instance.

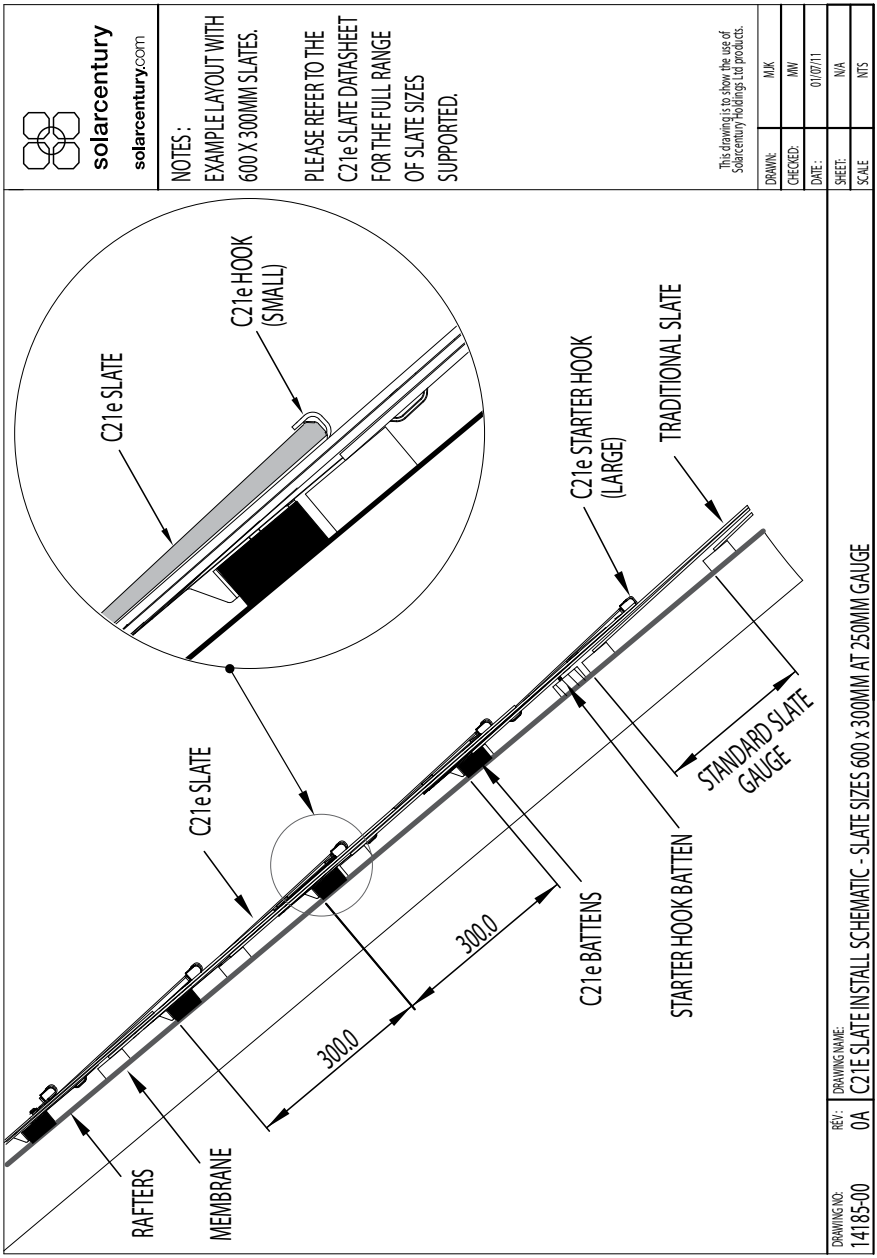
If your installer or maintainer considers the Product is not performing according to the warranty, please (together with the assistance of your installer or maintainer) provide Solarcentury with the details below so that we can consider your claim, marking your correspondence for the attention of the Solarcentury Customer Services. Please include:

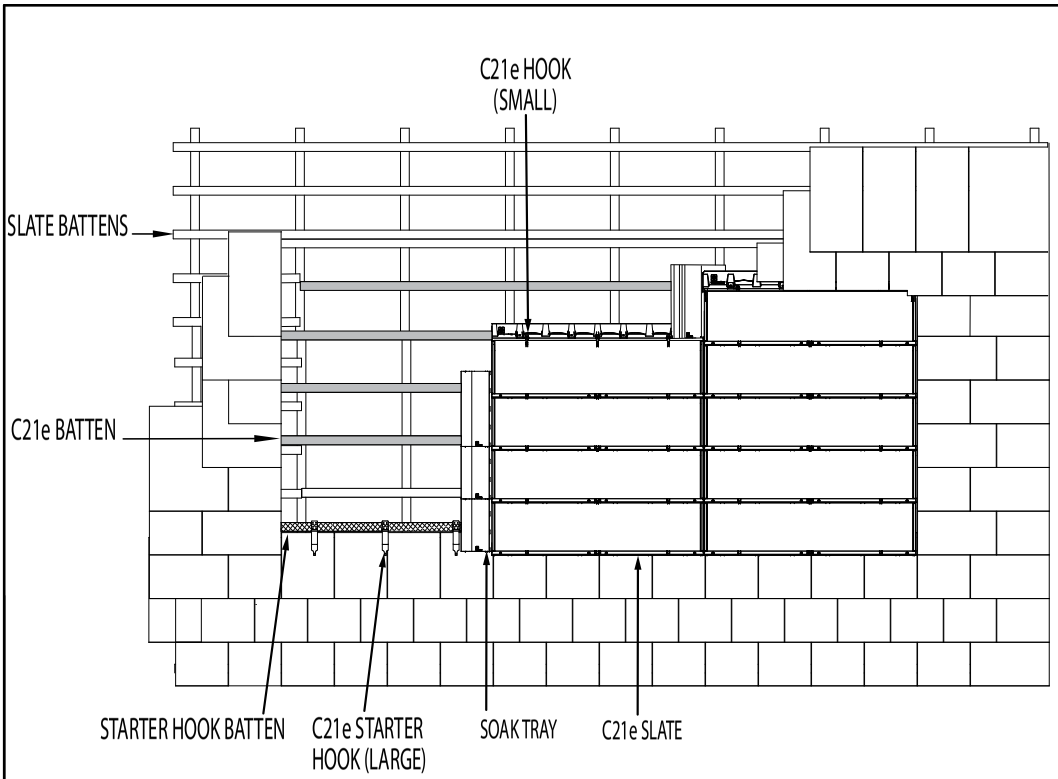
- Confirmation that you have reviewed the Product Guide but the results indicate that the Product may be failing to perform to the guaranteed standard;
- Confirmation that conditions (a) to (k) above are met;
- A detailed description of the Product failure, including supporting images;
- Adequate documentation of proof of purchase (including details of purchase receipts);
- The Product's serial number; and
- Details of when and by whom the Product was purchased and installed and the address of the property at which it was installed.

Solar Century Holdings Limited
91-94 Lower Marsh
London SE1 7AB
020-7803-0180
customerservices@Solarcentury.com

Part number: 15195-01

Appendix 1: C21e Slate Schematic - Typical Layout & Fixing Detail





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NOTES :
EXAMPLE LAYOUT WITH 600 X 300MM SLATES.

PLEASE REFER TO THE C21e SLATE DATASHEET FOR THE FULL RANGE OF SLATE SIZES SUPPORTED.

This drawing is to show the use of Solarcentury Holdings Ltd products.

DRAWN:	MJK
CHECKED:	MW
DATE :	01/07/11
SHEET:	N/A
SCALE	NTS

DRAWING NO:	REV:	DRAWING NAME:
14185-00	0A	C21E SLATE INSTALL SCHEMATIC - SLATE SIZES 600 X 300MM AT 250MM GAUGE

Appendix 2: Soak Tray Installation Tips

WARNING: C21e Soak Trays should NEVER extend onto the glass surface of the C21e unit, or the cells will be shaded, voiding the warranty.

✓ TIP: Edge soak trays on the far right and left of the array (between C21e unit and slates) can sit under or over the C21e frame. Having some soak trays below and some above the C21e frame will manage the flow of any water.

The soak trays should always remain aligned with the bottom of the slates, and positioned so that the Solarcentury logo is **always** under the C21e unit.

✓ TIP: It is advised that you position the soak tray over the frame of the C21, if this can be done without obscuring the laminate (a).

If the soak tray covers the C21e laminate, as shown in Diagram b, you should trim the soak tray (c):

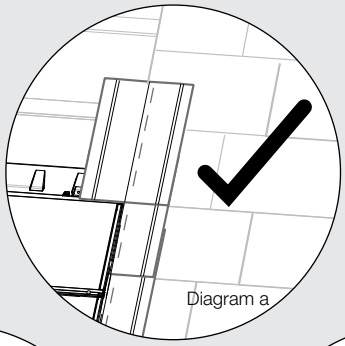


Diagram a

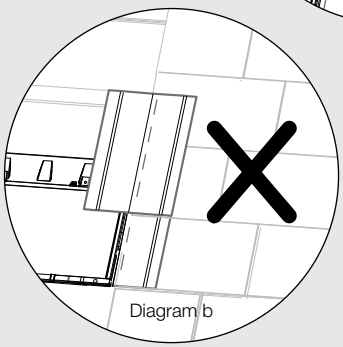


Diagram b

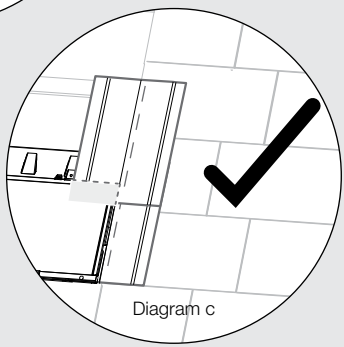
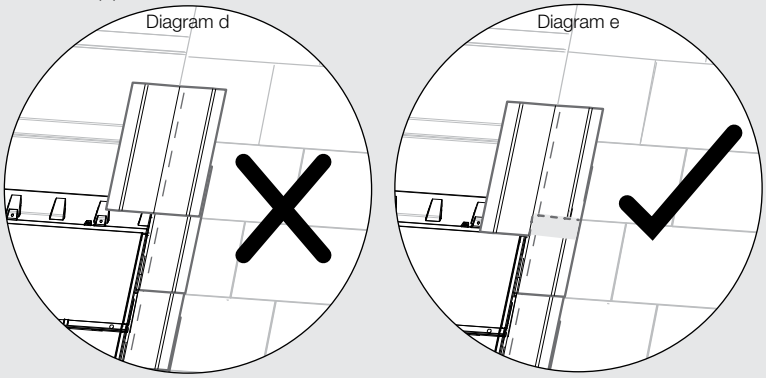


Diagram c

Part number: 15195-01

✓ TIP: If the soak tray partially covers the C21e frame (d), and there is not enough headlap, you should bring the soak tray down to cover the C21e frame fully.

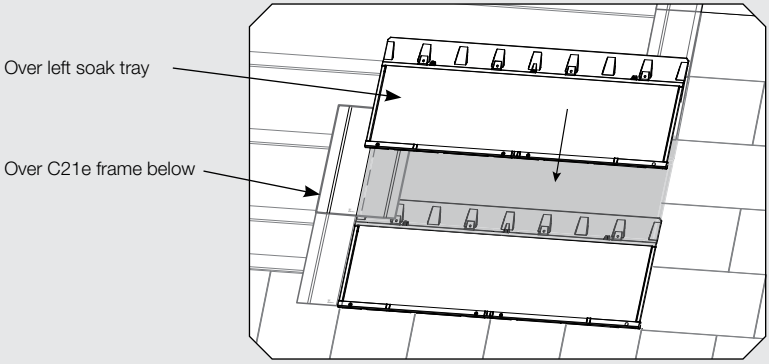
Then trim the soak tray corner so it remains in line with the conventional slate (e).



✓ **NOTE**: Middle soak trays between two C21e units should always sit on the C21e battens, and be aligned with the bottom of the C21e frame.

The raised centre line of the middle soak trays should sit beneath the C21 on the right, with the Solarcentury logo on the left.

The soak tray should be over the frame of the C21e on the course below. This will manage the flow of any water.



Part number: 15195-01

Appendix 3: String Layouts

For all standard layouts, individual columns are connected in exactly the same way using the return cables. The length of the return cable will correspond to the layout selected at the time of ordering.

Final connection of the columns to form the string or strings should follow the guidance in Appendix 4.

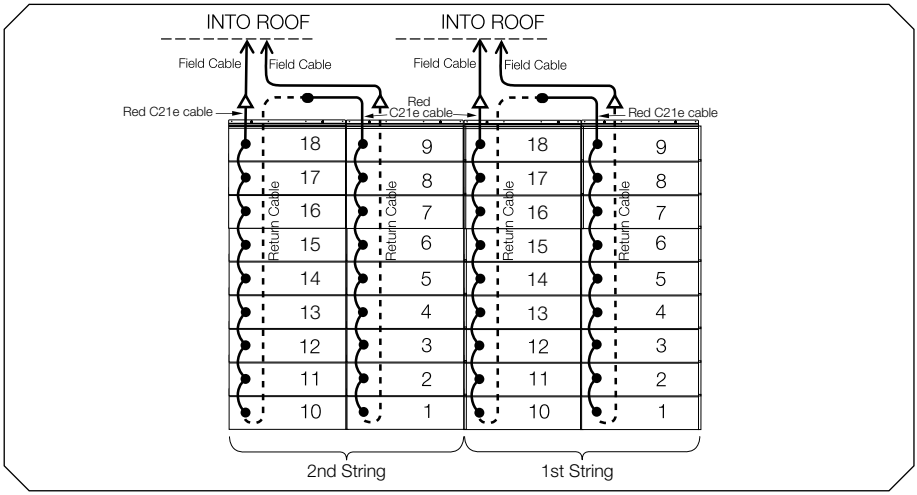
Single String Systems (12 to 36, 48 and 54 C21e units)

For these standard system sizes, all of the C21e units are connected together to form a single string, as shown in the example in this guide.

Two String Systems (42 and 60 to 80 C21e units)

For these standard system sizes, two strings are needed irrespective of the physical roof layout. For all two string systems you should consider the C21e units as two separate arrays, with an equal number of C21e units in each array.

For example, a system of 36 C21e units should be split evenly into two strings, each with 18 C21e units. See below for details.



36 C21e unit example

✓ NOTE: The number of strings is dependent on the System Design for the size of the C21e array. This should not be changed. (See Appendix 5 for more details.)

Appendix 4: String Checker User Guide

1. Connect the red test lead to the V'Ω input connector (1) and the black test lead to the COM input connector (2).

2. From the off position, turn the centre dial one place in an anti-clockwise direction. The Function Range is now set to 600Vdc (3).

3. Connect the opposite ends of the test leads to the output strings of the C21e tile or slate. Note the connectors will only connect one way.

4. The display will now read the DC voltage produced by the C21e Units.

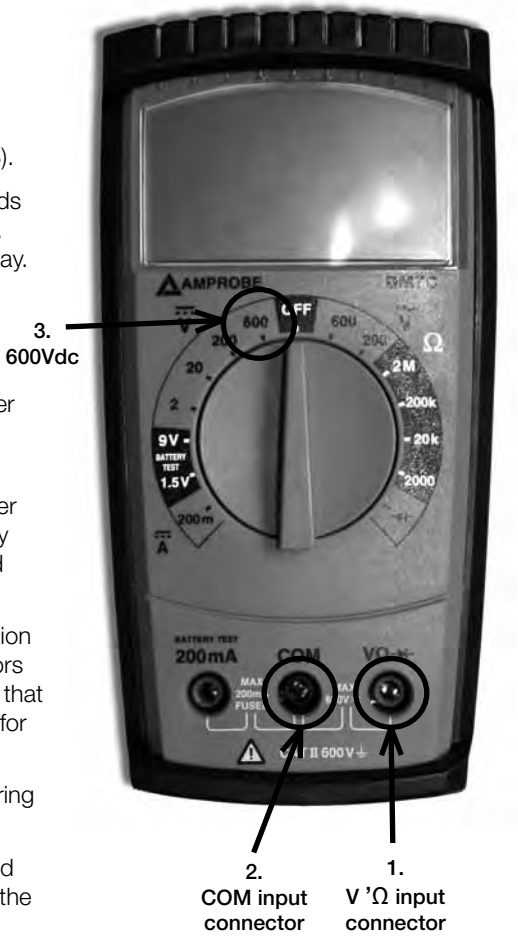
5. The voltage will vary on the amount of daylight falling on the C21e Units. Please refer to the table as an approximate guide to the measurement.

6. If the value displayed on the String Checker screen is below the figure for an overcast day then there is an error with the installation and string connection.

7. In this situation, retrace the string connection through from the start ensuring the connectors are pushed firmly together with no gaps and that the C21e Units follow the Stringing Diagram for the given layout.

8. Once the reading is correct, switch the String Checker to the OFF position.

9. You can now disconnect the test leads and continue with the C21e installation following the C21e On Roof Installation Guide.



Please refer to the user manual for full operating instructions.

String checkers with touch proof test leads are available to order from Solarcentury.

Part number: 15195-01

Appendix 5: Component List and Roof Dimensions

C21e System Size			C21e Layout Option[1]		Standard Roof Components Provided (For slate gauges below 200mm additional soak trays will be needed)[2]				
Number of C21e Units	kWp	Strings	Rows	Columns	Return Cables Qty[4] x Length (m)	Soak Trays[3]	C21e Starter Hooks (large)	C21e Hooks (small)	Pairs of Field Cables
12	0.60	1	12	1	1 x 4.5m	40	3	36	1
			6	2	2 x 3m	30	6		
			4	3	3 x 2m	30	9		
			3	4	4 x 2m	20	12		
			2	6	6 x 2m	20	18		
			1	12	n/a	20	36		
18	0.90	1	18	1	1 x 6m	60	3	54	1
			9	2	2 x 4.5m	40	6		
			6	3	3 x 3m	40	9		
			3	6	6 x 2m	30	18		
			2	9	9 x 2m	30	27		
			1	18	n/a	30	54		
24	1.20	1	12	2	2 x 4.5m	50	6	72	1
			8	3	3 x 3m	50	9		
			6	4	4 x 3m	40	12		
			4	6	6 x 2m	40	18		
			3	8	8 x 2m	40	24		
			2	12	12 x 2m	30	36		
30	1.50	1	15	2	2 x 6m	70	6	90	1
			10	3	3 x 4.5m	60	9		
			6	5	5 x 3m	50	15		
			5	6	6 x 2m	50	18		
			3	10	10 x 2m	40	30		
			2	15	15 x 2m	40	45		
36	1.80	1	18	2	2 x 6m	80	6	108	1
			9	4	4 x 4.5m	60	12		
			6	6	6 x 3m	50	18		
			3	12	12 x 2m	50	36		
			2	18	18 x 2m	50	54		
42	2.10	2	7	6	6 x 3m	60	18	126	2
			3	14	14 x 2m	50	42		
48	2.40	1	12	4	4 x 4.5m	80	12	144	1
			8	6	6 x 3m	70	18		
			6	8	8 x 3m	70	24		
			4	12	12 x 2m	60	36		
			3	16	16 x 2m	60	48		
54	2.70	1	9	6	6 x 4.5m	80	18	162	1
			3	18	18 x 2m	70	54		
60	3.00	2	15	4	4 x 6m	100	12	180	2
			10	6	6 x 4.5m	90	18		
			6	10	10 x 3m	80	30		
			5	12	12 x 2m	80	36		
			3	20	20 x 2m	70	60		
66	3.30	2	11	6	6 x 4.5m	90	18	198	2
72	3.60	2	18	4	4 x 6m	110	12	216	2
			12	6	6 x 4.5m	100	18		
			9	8	8 x 4.5m	100	24		
			6	12	12 x 3m	90	36		
			4	18	18 x 2m	90	54		
78	3.90	2	13	6	6 x 4.5m	110	18	234	2
80	4.00	2	20	4	4 x 10m	130	12	252	2
			10	8	8 x 4.5m	110	24		

Notes:
(1) Additional layouts may be possible for some system sizes, but require additional Soak Trays and Return Cables to those provided in the Standard Systems.
(2) The components provided in each system will support the layouts as shown, a small quantity of spare screws and hooks are included.
(3) The standard quantity of Soak Trays provided will support conventional slate set out at a gauge down to 200mm. For narrower gauges additional Soak Trays will be required.
(4) One Return Cable is provided per C21e Column. The cable length is dependent on the number of C21e rows in the layout, as shown.
(5) The dimensions stated are for guidance and are based on the C21e Design Rules for the range of approved slate sizes as stated on the product datasheet. Please refer to the C21e Slate datasheet for full specification details.

C21e System Size		Dimensions of C21 Array (excluding slate border)		Total Roof Dimensions Required (including the slate border for example slate sizes[5])					
				500 x 250mm (at 200mm gauge)			600 x 300mm (at 250mm gauge)		
Number of C21e units	kWp	Length (m)	Width (m)	Length (m)	Width (m)	Area (m^2)	Length (m)	Width (m)	Area (m^2)
12	0.60	3.60	1.21	4.80	2.46	11.81	5.10	2.71	13.82
		1.80	2.42	3.00	3.67	11.01	3.30	3.92	12.94
		1.20	3.63	2.40	4.88	11.71	2.70	5.13	13.85
		0.90	4.84	2.10	6.09	12.79	2.40	6.34	15.22
		0.60	7.26	1.80	8.51	15.32	2.10	8.76	18.40
		0.30	14.52	1.50	15.77	23.66	1.80	16.02	28.84
18	0.90	5.40	1.21	6.60	2.46	16.24	6.90	2.71	18.70
		2.70	2.42	3.90	3.67	14.31	4.20	3.92	16.46
		1.80	3.63	3.00	4.88	14.64	3.30	5.13	16.93
		0.90	7.26	2.10	8.51	17.87	2.40	8.76	21.02
		0.60	10.89	1.80	12.14	21.85	2.10	12.39	26.02
		0.30	21.78	1.50	23.03	34.55	1.80	23.28	41.90
24	1.20	3.60	2.42	4.80	3.67	17.62	5.10	3.92	19.99
		2.40	3.63	3.60	4.88	17.57	3.90	5.13	20.01
		1.80	4.84	3.00	6.09	18.27	3.30	6.34	20.92
		1.20	7.26	2.40	8.51	20.42	2.70	8.76	23.65
		0.90	9.68	2.10	10.93	22.95	2.40	11.18	26.83
		0.60	14.52	1.80	15.77	28.39	2.10	16.02	33.64
30	1.50	4.50	2.42	5.70	3.67	20.92	6.00	3.92	23.52
		3.00	3.63	4.20	4.88	20.50	4.50	5.13	23.09
		1.80	6.05	3.00	7.30	21.90	3.30	7.55	24.92
		1.50	7.26	2.70	8.51	22.98	3.00	8.76	26.28
		0.90	12.10	2.10	13.35	28.04	2.40	13.60	32.64
		0.60	18.15	1.80	19.40	34.92	2.10	19.65	41.27
36	1.80	5.40	2.42	6.60	3.67	24.22	6.90	3.92	27.05
		2.70	4.84	3.90	6.09	23.75	4.20	6.34	26.63
		1.80	7.26	3.00	8.51	25.53	3.30	8.76	28.91
		0.90	14.52	2.10	15.77	33.12	2.40	16.02	38.45
		0.60	21.78	1.80	23.03	41.45	2.10	23.28	48.89
42	2.10	2.10	7.26	3.30	8.51	28.08	3.60	8.76	31.54
		0.90	16.94	2.10	18.19	38.20	2.40	18.44	44.26
48	2.40	3.60	4.84	4.80	6.09	29.23	5.10	6.34	32.33
		2.40	7.26	3.60	8.51	30.64	3.90	8.76	34.16
		1.80	9.68	3.00	10.93	32.79	3.30	11.18	36.89
		1.20	14.52	2.40	15.77	37.85	2.70	16.02	43.25
		0.90	19.36	2.10	20.61	43.28	2.40	20.86	50.06
54	2.70	2.70	7.26	3.90	8.51	33.19	4.20	8.76	36.79
		0.90	21.78	2.10	23.03	48.36	2.40	23.28	55.87
60	3.00	4.50	4.84	5.70	6.09	34.71	6.00	6.34	38.04
		3.00	7.26	4.20	8.51	35.74	4.50	8.76	39.42
		1.80	12.10	3.00	13.35	40.05	3.30	13.60	44.88
		1.50	14.52	2.70	15.77	42.58	3.00	16.02	48.06
		0.90	24.20	2.10	25.45	53.45	2.40	25.70	61.68
66	3.30	3.30	7.26	4.50	8.51	38.30	4.80	8.76	42.05
72	3.60	5.40	4.84	6.60	6.09	40.19	6.90	6.34	43.75
		3.60	7.26	4.80	8.51	40.85	5.10	8.76	44.68
		2.70	9.68	3.90	10.93	42.63	4.20	11.18	46.96
		1.80	14.52	3.00	15.77	47.31	3.30	16.02	52.87
		1.20	21.78	2.40	23.03	55.27	2.70	23.28	62.86
78	3.90	3.90	7.26	5.10	8.51	43.40	5.40	8.76	47.30
80	4.00	6.00	4.84	7.20	6.09	43.85	7.50	6.34	47.55
		3.00	9.68	4.20	10.93	45.91	4.50	11.18	50.31

Notes:

Notes:

Part number: 15195-01

C21 solar tiles & slates

String Check Results

Use the tables below to record the string voltages.

Once completed, this installation guide should be passed to the Electrician who will be responsible for commissioning the system.

String Checker Voltage Measurement Table				
System Size (total number of C21e units in the system)	Number of Strings	Number of C21e Slates in each String	Voltage per string on Sunny Day	Voltage per string on Overcast Day
			SUN	CLOUD
12	1	12	137	109
18	1	18	205	164
24	1	24	274	219
30	1	30	342	274
36	1	36	205	164
42	2	21	239	192
48	1	48	274	219
54	1	54	308	246
60	2	30	342	274
66	2	33	376	301
72	2	36	410	328
78	2	39	445	356
80	2	40	456	365

Your recorded measurements:

		Weather conditions *(please tick)*	SUN	CLOUD
String 1				
String 2				

Part number: 15195-01

solarcentury

91-94 Lower Marsh
Waterloo
London SE1 7AB
T+44 (0)20 7803 0100
F+44 (0)20 7803 0101
www.solarcentury.com

For technical product support, please contact Solarcentury on (0)20 7803 0115
techsupport@solarcentury.com

For customer service support, please contact Solarcentury on (0)20 7803 0180
customerservices@solarcentury.com